LYNX Blue Line Extension

(Northeast Corridor)

Light Rail Project

Contract #: 08-477

WBS #: 5.03

Sugar Creek / NCRR Alignment Alternatives Analysis

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I. Introduction

During the design process, two alignment options for the Light Rail Alternative were defined to transition from the North Carolina Railroad (NCRR) right-of-way (ROW) to North Tryon Street/US-29. Those two options are the Sugar Creek Design Option and the North Carolina Railroad (Locally Preferred Alignment - LPA) option. The Sugar Creek Design Option would transition from the NCRR ROW just north of the Sugar Creek Road at-grade crossing towards North Tryon Street/US-29 and potentially create an opportunity for redevelopment at the corner of Sugar Creek Road and North Tryon Street/US-29 (shown on Figure 1). The NCRR (LPA) alignment would continue along the NCRR ROW and transition to North Tryon Street/US-29 just before Old Concord Road (shown on Figure 2).

In addition to the Light Rail Alternative – NCRR (LPA) Alignment, streetscape improvements to North Tryon Street/US-29 would occur in concert. Due to the fact the City of Charlotte visions this portion of North Tryon Street/US-29 as an avenue (with some boulevard characteristics), the design speed would be 35 mph. Between Sugar Creek Road and Eastway Drive, the cross-section would consist of four lanes with intermittent medians in order to provide left turn access at all side street intersections. Bike lanes would also be provided along with an eight - foot planting strip and six - foot sidewalk. Between Eastway Drive and Old Concord Road, the cross-section would consist of five lanes (two lanes in-bound and three lanes out-bound) with intermittent medians in order to provide left turn access at all side street intersections. Bike lanes would also be provided along with an eight - foot planting strip and six - foot sidewalk.

The following factors, Environmental, Transportation, and Costs were analyzed to develop a qualitative and quantitative analysis of the two options. The analysis factors were developed to evaluate potential impacts to the environmental elements and transportation characteristics along North Tryon Street/US-29. This analysis was completed in January 2009 and reflects information available at that time.

II. Environmental Analysis Factors

The environmental analysis factors are summarized on Table 1. The environmental analysis evaluates the impacts of the transit project only, and does not include the streetscape improvements. The following section describes the analysis, assumptions and results of the analysis.

A. Acquisitions & Displacements

The City of Charlotte Engineering and Property Management Department, Real Estate Division, provided the following estimate of acquisitions and displacements. The detailed listing is included in Appendix A.

Light Rail Alternative - Sugar Creek Design Option:

- 16 total property acquisitions
  - 14 total business property acquisitions
  - 2 vacant property acquisitions
- 55 partial property acquisitions
  - 54 partial business property acquisitions
  - 1 partial residential property acquisition
- 20 business relocations

Light Rail Alternative - NCRR (LPA) Alignment:

- 12 total property acquisitions
  - 11 total business property acquisitions
  - 1 vacant property acquisition
- 26 partial property acquisitions
  - 22 partial business property acquisitions
  - 4 partial vacant property acquisitions
- 2 total business relocations

B. Noise

Buildings closest to the light rail tracks would have the greatest potential to experience a noise impact. Therefore, the Federal Transit Agency (FTA) has identified screening distances that identify buildings that need to be considered when conducting a noise analysis. Sensitive Receptors located within the FTA screening distances of 350 feet unobstructed and 175 feet for obstructed were assessed for potential noise impacts. Below lists the Sensitive Receptors located within the screening distances.

Light Rail Alternative - Sugar Creek Design Option:

- 3 Churches located in shopping center at 4409 North Tryon Street/US-29 (200 feet west of alignment)
- 1 Daycare at 131 Bennett Road (170 feet west of alignment)
- 1 Church located at 4801 North Tryon Street/US-29 (250 feet west of alignment)
- 1 Church located at 4901 North Tryon Street/US-29 (300 feet west of alignment)
- 1 Church located at 5801 Old Concord Road (350 feet east of alignment) – common to both alignments
- 1 medical office at 4234 North Tryon Street/US-29 (medical dialysis)
- 1 School – Cross Roads Charter School at 5500 North Tryon Street/US-29 – common to both alignments (75 feet east of alignment)
- 18 trailers located west of North Tryon Street/US-29 and north of Northchase Drive (250 feet west of alignment) - 8 trailers are common to both alignments

Light Rail Alternative - NCRR (LPA) Alignment:

- 36 Houses (on the west side of the alignment there are 12 houses on Bearwood Avenue and 6 on Howie Circle that are within the 350 feet screening distance for unobstructed views and on the east side of the alignment there are four on Leafmore Drive and 14 on Prince Charles Street).
- 1 Church located at 4301 Howie Circle (80 feet east of the alignment).
- 1 Church located at 5801 Old Concord Road (350 feet east of alignment) – common to both alignments
- 1 medical facility, CMC Northpark Medical Office/Teen's Health Clinic, at 251 Eastway Drive (50 feet west of alignment)
- 1 School – Cross Roads Charter School at 5500 North Tryon Street/US-29 – common to both alignments (100 feet west of alignment)
- 8 trailers located west of North Tryon Street/US-29 and north of Northchase Drive (250 feet west of alignment) - eight trailers are common to both alignments

After further noise impacts analysis, the following lists the output of the analysis.

Light Rail Alternative - Sugar Creek Design Option:

- There are no noise impacts expected along this alignment option.

Light Rail Alternative - NCRR (LPA) Alignment:

- There are no noise impacts expected along this alignment option.

C. Vibration

Sensitive sites within 63 feet were identified to determine if impact from vibration is possible. The distance of 63 feet is the distance that has been identified for this portion of the rail alignment that could result in a potential vibration impact for buildings located within this distance. The following locations were identified for vibration analysis.

Light Rail Alternative - Sugar Creek Design Option:

- Republic Steel Building (historic)
- Standard Chemical Building (historic)

Light Rail Alternative - NCRR (LPA) Alignment:

- 1 house in cul-de-sac on Leafmore Drive
- 1 house in cul-de-sac on St. Anne's Place
- 1 medical building at 251 Eastway Drive
- 1 historic building - Republic Steel Building (historic)
- Standard Chemical Building (historic)

After further vibration impacts analysis, the following lists the output of the analysis.

Light Rail Alternative - Sugar Creek Design Option:

- There are no vibration impacts expected along this alignment option.

Light Rail Alternative - NCRR (LPA) Alignment:

- 1 residential property would be potentially impacted by vibration of light rail
  - 342 St. Anne's Place

D. Historic Resources

National Register Listed and Eligible Properties as agreed upon by the State Historic Preservation Office (SHPO) on January 13, 2009, were used as the basis of determination for the presence of historic properties. National Register Listed (NRL) properties are listed in the National Register of Historic Places (NRHP) whereas National Register Eligible (NRE) properties are identified as eligible for listing in the NRHP. Eligible properties receive the same regulatory protection under Section 106 of the National Historic Preservation Act and Section 4(f) of the US DOT regulations.

Light Rail Alternative - Sugar Creek Design Option:

- Republic Steel Corporation Plant (NRE) – a direct impact would result from the crossing through the property. The introduction of a new visual element could result in an indirect impact on this resource.
- Standard Chemical Products Plant (NRE) - indirect impacts are likely as a new visual element would be introduced within the freight right-of-way.
- General Motors Training Center/Charter School (NRE) – would result in a potential indirect impact due to introduction of a new visual element.

Light Rail Alternative – NCRR (LPA) Alignment:

- Republic Steel (NRE) – indirect impacts are likely as a new visual element would be introduced within the freight right-of-way.
- Standard Chemical Building (NRE) - indirect impacts are likely as a new visual element would be introduced within the freight right-of-way.
- General Motors Training Center/Charter School (NRE) - would result in a potential indirect impact due to introduction of new visual element.

E. Parklands

Light Rail Alternative - Sugar Creek Design Option:

- No parks within 500 feet of the alignment.

Light Rail Alternative – NCRR (LPA) Alignment:

- Howie Acres Park on Howie Circle (County neighborhood park) is located approximately 500 feet south of the alignment and is located adjacent to the NCRR ROW. The NCRR freight tracks would be located between the light rail tracks and the park. Minimal indirect impacts would result. A new visual element, the light rail tracks and supporting catenary system would be introduced; however, vegetation currently screens the freight corridor and serves to buffer the visual element of the freight corridor. Potential noise/vibration impacts could result. No direct impacts would occur.
- Eastway Park (total of 126 acres) is planned at 423 Eastway Drive and is located directly adjacent to the NCRR ROW. The NCRR freight tracks would be located between the light rail tracks and the park. A new visual element would be introduced however vegetation currently screens the freight corridor and serves to buffer the visual element of the freight corridor. Potential noise/vibration impacts could result. No direct impacts would occur.

F. Wetlands

Light Rail Alternative - Sugar Creek Design Option:

- 400 linear feet of stream and 21,000 square feet of SWIM buffers are likely to have a direct impact from the location of the Sugar Creek Station park-and-ride lot.

Light Rail Alternative – NCRR (LPA) Alignment:

- 930 linear feet of stream and 11,250 square feet of SWIM buffers are likely to have a direct impact from the location of the Old Concord Road Station park-and-ride. A population of a North Carolina rare species (tree-foil birdfoot – *Lotus Helleri*) is located in the NCRR ROW; however, no protection for this species exists at the state or federal level so it can be relocated without impact.

G. Visual & Aesthetic

Light Rail Alternative - Sugar Creek Design Option:

- A total of 737.1 feet of bridge structures
  - Light Rail and Station Bridge over Sugar Creek Road = 90.4 feet
  - Light Rail Bridge over North Tryon Street/US-29 = 457feet
  - Light Rail Bridge over Eastway Drive = 189.7 feet
- A total of 5,090 feet of MSE walls
  - North Tryon Street/US-29 entrance into median MSE walls = 2,850 feet

- Eastway Drive MSE walls = 2,240 feet

Light Rail Alternative – NCRR (LPA) Alignment:

- A total of 625.5 feet of bridge structures
  - Light Rail and Station Bridge over Sugar Creek Road = 90.4 feet
  - Extending Eastway Drive ridge over Light Rail = 90.1 feet
  - Light Rail Bridge over Old Concord Road = 445 feet
- A total of 2,930 feet of MSE walls
  - Old Concord Road and North Tryon Street/US-29 MSE walls = 2,930 feet

H. Environmental Justice

Light Rail Alternative - Sugar Creek Design Option:

- Hidden Valley Neighborhood (Environmental Justice Community with "Threatened" status) is located to the north of the alignment. No direct impacts would result and noise and vibration impacts are unlikely. This neighborhood would have improved access to transit service as a result of the project.

Light Rail Alternative – NCRR (LPA) Alignment:

- Three separate residential neighborhoods highlighted as Environmental Justice/Threatened Communities are located along this alignment and include: North Charlotte, Howie Acres, and Hampshire Hills. Potential vibration impacts could occur at three residences located within the Howie Acres Neighborhood. It is possible that adverse impacts could result from potential vibration of the project to a few homes within the Howie Acres Neighborhood; however, mitigation could resolve these impacts and the impacts would no longer be considered adverse. Noise and vibration impacts are not likely within the North Charlotte or Hampshire Hills neighborhoods. These neighborhoods would have improved access to transit service as a result of the project.

III. Transportation Analysis Factors

The transportation analysis factors are summarized on Table 2. The following section describes the analysis, assumptions and results of the analysis. For the traffic analysis, the Light Rail Alternative – NCRR Alignment includes the impact of the North Tryon Street/US-29 Streetscape improvements. A detailed summary of the Streetscape analysis performed is included in Appendix B.

A. Travel Time – Non Transit Vehicles

Vissim traffic modeling software was used to determine how long it will take for a vehicle to travel along North Tryon Street/US-29 from just south of Sugar Creek Road to just north of Orr Road during the AM and PM peak travel periods of 2030. Travel times will be longer when traffic congestion is higher. Traffic was modeled in fifteen-minute intervals starting at the beginning of the peak hour and ending two hours later. The resulting fifteen-minute interval travel times and numbers of vehicles were averaged.

Light Rail Alternative - Sugar Creek Design Option:

- The table below shows the average travel time (measured in minutes) and the average number of vehicles during a fifteen-minute interval.

	Average Travel Time During a 15-Minute Period			
	NB Tryon Street		SB Tryon Street	
	Distance Traveled = 1.90 miles		Distance Traveled = 1.81 miles	
	Travel Time (min)	Number of Vehicles	Travel Time (min)	Number of Vehicles
AM	9	56	9	160
PM	20	134	11	84

Light Rail Alternative – NCRR (LPA) Alignment:

- The table below shows the average travel time (measured in minutes) and the average number of vehicles during a fifteen-minute interval.

	Average Travel Time During a 15-Minute Period			
	NB Tryon Street		SB Tryon Street	
	Distance Traveled = 1.90 miles		Distance Traveled = 1.81 miles	
	Travel Time (min)	Number of Vehicles	Travel Time (min)	Number of Vehicles
AM	17	61	13	176
PM	14	161	12	110

B. Travel Time – Light Rail Vehicle

Light Rail Alternative - Sugar Creek Design Option:

- Northbound travel time for the light rail vehicle along the Sugar Creek Design Option would take approximately 24 minutes.

Light Rail Alternative – NCRR (LPA) Alignment:

- Northbound travel time for the light rail vehicle along the NCRR corridor would also take approximately 24 minutes.

C. Speed

The average vehicle speed (measured in miles per hour) during a fifteen-minute interval was calculated based on the average travel time and distance traveled along North Tryon Street/US-29 from just south of Sugar Creek Road to just north of Orr Road. Speeds will be higher when traffic congestion is lower.

Light Rail Alternative - Sugar Creek Design Option:

	Average Speed During a 15-Minute Period			
	NB Tryon Street		SB Tryon Street	
	Distance Traveled = 1.90 miles		Distance Traveled = 1.81 miles	
	Speed (mph)	Number of Vehicles	Speed (mph)	Number of Vehicles
AM	14	56	13	160
PM	6	134	13	84

Light Rail Alternative – NCRR (LPA) Alignment:

	Average Speed During a 15-Minute Period			
	NB Tryon Street		SB Tryon Street	
	Distance Traveled = 1.90 miles		Distance Traveled = 1.81 miles	
	Speed (mph)	Number of Vehicles	Speed (mph)	Number of Vehicles
AM	8	61	9	176
PM	8	161	10	110

D. Intersection Analysis

Synchro and Vissim software were used to conduct the intersection analysis. Within this analysis, eight intersections along North Tryon Street/US-29 were analyzed. Those eight intersections are listed below.

- Sugar Creek Road
- Eastway Drive
- Old Concord Road
- Northchase Drive
- Wellingford Drive
- Mellow Drive
- Bingham Drive
- Lambeth Drive

E. Intersection Delay

Intersection delay (measured in minutes) is calculated by taking a volume weighted average of the individual turn movement delays at an intersection. Delays will be higher when traffic congestion is higher. As stated before, Vissim was used to model traffic in fifteen-minute intervals. Vissim calculated the intersection delay based on the turn movement volumes of an intersection. The intersection delays recorded during each 15-minute interval of the peak hour were averaged.

Light Rail Alternative - Sugar Creek Design Option:
Under the LPA – Sugar Creek Design Option, the delay at a majority of the side street intersections would be reduced due to the elimination of left turn movements.

Light Rail Alternative – NCRR (LPA) Alignment:
Under the LPA – NCRR Alignment, the current intersections and left turn movements would still be provided under this scenario.

North Tryon Street/US-29 Streetscape: Light Rail Alternative – NCRR (LPA) Alignment:
Under the Streetscape scenario, pedestrian crossings would be provided at an intersection, which in turn creates longer delays for all approaches due to the need to provide time for pedestrians to cross the travel lanes. In addition, there is a reduction in the number of travel lanes through most of the section.

Average Peak Hour Delay (Minutes)										
	2007 Existing		2030 No-Build		2030 Sugar Creek Design Option		2030 Light Rail Alternative – NCRR (LPA) Alignment		2030 North Tryon Street/US-29 Streetscape: Light Rail Alternative – NCRR (LPA) Alignment	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Sugar Creek	2.5	1.2	4.0	1.9	2.0	3.9	1.9	3.4	3.9	1.9
Eastway	0.5	1.7	0.8	2.2	1.1	1.2	2.1	0.9	1.2	3.9
Old Concord	0.5	1.0	1.1	1.0	0.8	0.7	1.5	0.6	1.2	1.2
Northchase	0.3	0.4	0.8	1.6	0.1	0.1	0.5	0.4	6.2	1.6
Wellingford	0.7	1.0	3.2	5.2	1.3	1.3	0.7	1.2	4.6	10.04
Mellow	0.5	1.4	1.6	4.2	0.4	1.6	1.1	0.0	2.7	4.19
Bingham	0.4	1.7	0.9	--	0.0	1.5	0.9	1.0	1.4	--
Lambeth	0.9	2.1	--	--	0.1	0.8	1.2	0.6	--	--

Note: intersections with extremely high delays are noted as " -- "

F. Intersection Level of Service (LOS)

Intersection delay can be converted to a level of service (LOS). The LOS is an important measure of roadway congestion. The LOS is determined by calculating the delay for the intersection and converting it to a letter. The LOS ranges from A (no congestion) to F (severe congestion). The LOS criteria for signalized and un-signalized intersections are shown in the table below.

Signalized Intersections		Un-signalized Intersections	
LOS	Delay per Vehicle (seconds)	LOS	Delay per Vehicle (seconds)
A	≤10	A	≤10
B	>10 and ≤20	B	>10 and ≤15
C	>20 and ≤35	C	>15 and ≤25
D	>35 and ≤55	D	>25 and ≤35
E	>55 and ≤80	E	>35 and ≤50
F	>80	F	>50

The average peak hour delays were converted to a LOS.

Light Rail Alternative - Sugar Creek Design Option:
Under the LPA – Sugar Creek Design Option, the LOS at a majority of the side street intersections could improve due to the elimination of left turn movements.

Light Rail Alternative – NCRR (LPA) Alignment:

Under the LPA – NCRR Alignment, the current intersections and left turn movements would still be provided under this scenario.

North Tryon Street/US-29 Streetscape: Light Rail Alternative – NCRR (LPA) Alignment: Under the Streetscape scenario, there is a reduction in the number of travel lanes. One travel lane in each direction is eliminated through a majority of the section.

Peak Hour Level of Service (LOS)										
	2007 Existing		2030 No-Build		2030 Sugar Creek Design Option		2030 Light Rail Alternative – NCRR (LPA) Alignment		2030 North Tryon Street/US-29 Streetscape: Light Rail Alternative – NCRR (LPA) Alignment	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Sugar Creek	F	E	F	F	F	F	F	F	F	F
Eastway	C	F	D	F	E	E	F	E	F	F
Old Concord	C	E	E	E	D	D	F	D	E	E
Northchase	C	C	F	F	A	A	D	C	F	F
Wellingford	E	F	F	F	F	F	E	F	F	F
Mellow	D	F	F	F	C	F	F	F	F	F
Bingham	C	F	F	F	A	F	F	F	F	F
Lambeth	F	F	F	F	A	F	F	E	F	F

G. Intersection Volume to Capacity (V/C)

The V/C ratio is the demand volume divided by the capacity volume of the intersection. V/C ratios range from 0.00 to 1.00. A V/C ratio of 0.00 represents an intersection with no demand volume while a V/C ratio of 1.00 represents an intersection operating at capacity. A V/C ratio greater than 1.00 implies that the capacity of an intersection is not high enough to carry the demand volume.

Light Rail Alternative - Sugar Creek Design Option:

- V/C ratios at four intersections were determined based on Synchro models for the AM peak hour.
- V/C ratios at seven intersections were determined based on Synchro models for the PM peak hour.

Light Rail Alternative – NCRR (LPA) Alignment:

- V/C ratios at all eight intersections were determined based on Synchro models for the AM peak hour.
- V/C ratios at all eight intersections were determined based on Synchro models for the PM peak hour.

North Tryon Street/US-29 Streetscape: Light Rail Alternative – NCRR (LPA) Alignment:

- V/C ratios at three intersections were determined based on Synchro models for the AM peak hour.

- V/C ratios at three intersections were determined based on Synchro models for the PM peak hour

Intersection to Volume Capacity (V/C)										
	2007 Existing		2030 No-Build		2030 Sugar Creek Design Option v/c > 1.00		2030 Light Rail Alternative – NCRR (LPA) Alignment v/c > 1.00		2030 North Tryon Street/US-29 Streetscape: Light Rail Alternative – NCRR (LPA) Alignment v/c > 1.00	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Sugar Creek	1.17	0.93	1.54	1.21	1.09	0.97	1.01	1.00	1.54	1.21
Eastway	0.85	1.07	1.07	1.39	0.95	1.24	0.93	1.22	1.07	1.39
Old Concord	0.90	0.90	1.16	1.18	1.14	1.22	1.13	1.22	1.16	1.18
Northchase	0.55	0.57	0.72	0.74	0.69	0.70	0.67	0.69	1.28	1.05
Wellingford	0.49	0.71	0.94	0.92	0.53	0.52	0.53	0.53	1.13	1.23
Mellow	0.49	0.70	0.69	0.91	0.54	0.98	0.52	0.93	1.06	1.20
Bingham	0.63	0.69	0.82	12.43	0.56	1.05	0.54	1.02	1.10	12.44
Lambeth	0.65	0.82	466.83	--	0.88	0.94	0.90	1.05	464.96	--

Note: intersections with extremely high delays are noted as " -- "

H. Existing Bike / Ped LOS

The existing bike/ped LOS was analyzed at the three signalized intersections (Sugar Creek Road, Eastway Drive and Old Concord Road) within the study area. Future bike/ped LOS will be analyzed during the Draft Environmental Impact Statement (DEIS).

Light Rail Alternative - Sugar Creek Design Option:

- Bike LOS – all three are at a LOS F
- Ped LOS –one intersection is at LOS F and the other two intersections are at LOS E

Light Rail Alternative – NCRR (LPA) Alignment:

- Bike LOS – all three are at a LOS F
- Ped LOS – one intersection is at LOS F and the other two intersections are at LOS E

I. Left Turn Access on North Tryon Street/US-29

Light Rail Alternative - Sugar Creek Design Option:

- 85 driveway cuts would not have left turn access
- 6 intersections would become Right-Ins/Right-Out

Light Rail Alternative – NCRR (LPA) Alignment:

- 31 driveway cuts would not have left turn access based on the North Tryon Street/US-29 streetscape plan developed by Glatting Jackson.

J. U-Turn Locations

Light Rail Alternative - Sugar Creek Design Option:

- U-turns would be allowed at four intersections:
  - Sugar Creek Road
  - Eastway Drive
  - Old Concord Road
  - Lambeth Drive

Light Rail Alternative – NCRR (LPA) Alignment:

- U-turns would be allowed at all intersections.

IV. Costs

STV/Ralph Whitehead Associates completed an estimate of the comparative capital costs of the two light rail alignment options, as well as the North Tryon Street/US-29 streetscape based on 15% design plans. The City's Engineering and Property Management Department, Real Estate Division, provided the estimate of Real Estate costs. Following is a summary of the estimated costs in 2008 dollars. A more detailed summary is included in Appendix C.

Light Rail Alternative - Sugar Creek Design Option:
$168.5 million

Light Rail Alternative – NCRR (LPA) Alignment:
$111.1 million

North Tryon Street/US-29 Streetscape Improvements:
$21.7 million

V. Public Involvement

Two rounds of Public Involvement were held in order to receive feedback from the community on the two alternatives. The first round of workshops was held on July 10 and 15, 2008 and the second round of workshops was held on January 13 and 15, 2009. Appendix D contains the powerpoint presentations on the Sugar Creek/NCRR analysis from the two rounds of public workshops and a summary of all of the Northeast Corridor public involvement meetings.

TABLE 1

ENVIRONMENTAL ANALYSIS FACTORS SUGAR CREEK/NCRR ALIGNMENT ALTERNATIVES ANALYSIS

	LIGHT RAIL ALTERNATIVE - SUGAR CREEK DESIGN OPTION	LIGHT RAIL ALTERNATIVE - LPA (NCRR) ALIGNMENT	NOTES
	Sugar Creek & Eastway Station	**Sugar Creek & Eastway Station**	
	Park-and-Ride	Sugar Creek Park-and-Ride (South Side of Sugar Creek Road)	
ENVIRONMENTAL			
Acquisitions & Displacements	Total Acquisitions = 16 Business/Residential Relocations = 55	Total Acquisitions = 12 Business/Residential Relocations = 26	Number of potential acquisitions and relocations stemming from the City of Charlotte's Real Estate Division's analysis
Noise Receivers	0 sites impacted by increased noise	0 sites impacted by increased noise	
Vibration Receivers	0 sites impacted by vibration	3 residential sites impacted by vibration	
Historic & Archaeological Properties	1 direct impact; 2 indirect impacts	3 indirect impacts	Number of historic and archaeological properties impacted (direct and indirect)
Parklands	No parks within 500' of alternative	2 (Howie Acres Park & Eastway Specialty Park)	Number of parkland properties adjacent to rail corridor
Wetlands	May potentially impact 400 linear feet of stream and 21,000 sf of SWIM buffers	May potentially impact 930 linear feet of stream and 11,250 sf of SWIM buffers	Number of wetland properties that could potentially be impacted
Visual & Aesthetic	737.1' of Bridge Length (LR & Station bridge over Sugar Creek Rd, LR bridge over N. Tryon St, LR bridge over Eastway Dr) & 5,090' of MSE walls	625.5' of Bridge Length (LR & Station bridge over Sugar Creek Rd and LR bridge over Old Concord Rd) & 2,930' of MSE walls	Number of visual impacts (based on length of structures and retaining wall)
Environmental Justice	1 adjacent EJ neighborhood with no direct impacts	3 adjacent EJ neighborhoods with 3 residential properties having vibration impacts	Number of neighborhoods that could experience disproportionate or adverse impacts

TABLE 2

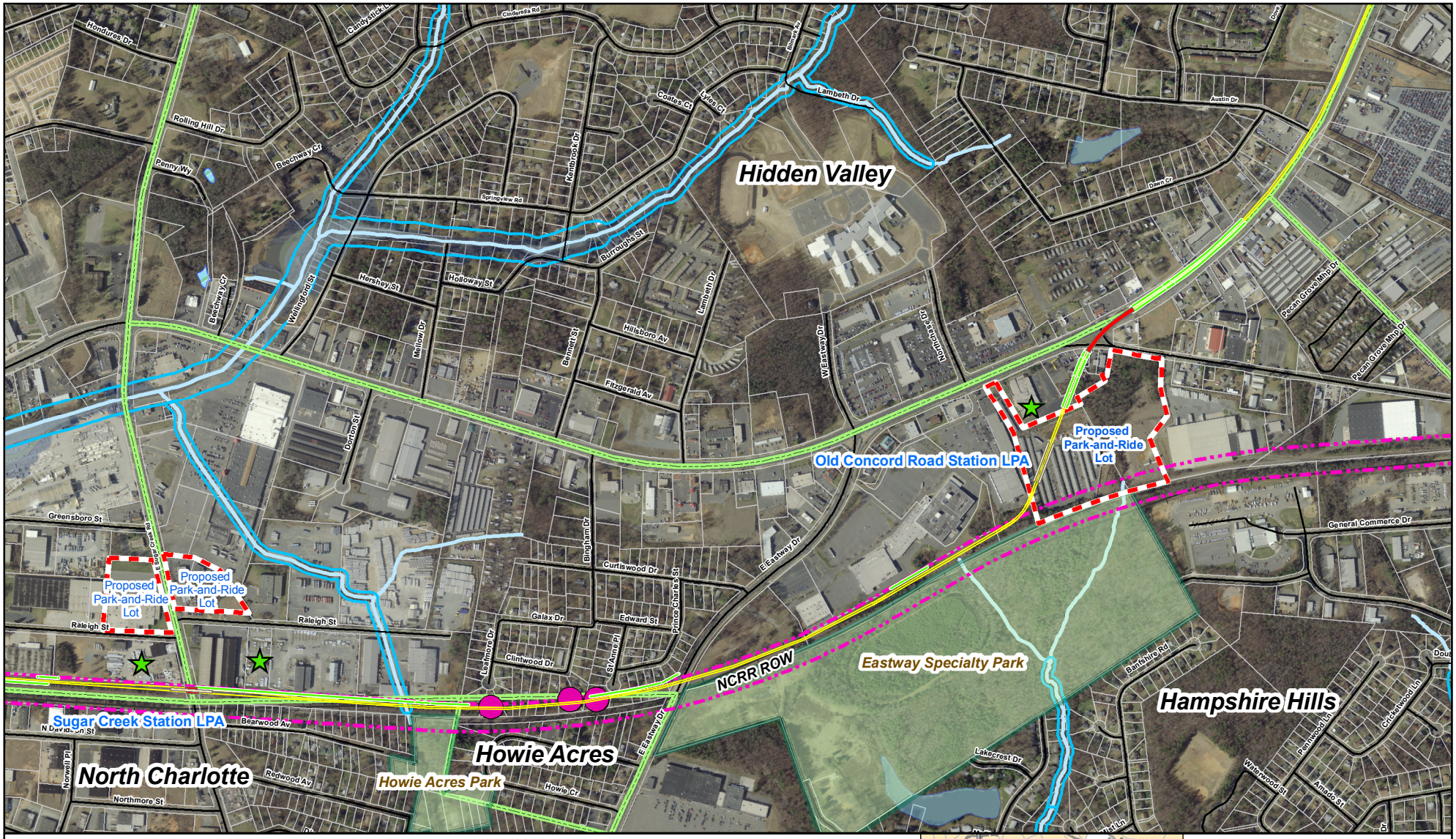
TRANSPORTATION ANALYSIS FACTORS SUGAR CREEK/NCRR ALIGNMENT ALTERNATIVES ANALYSIS

		2008 BASE YEAR	2030 NO BUILD	LIGHT RAIL ALTERNATIVE - SUGAR CREEK DESIGN OPTION	LIGHT RAIL ALTERNATIVE - LPA (NCRR) ALIGNMENT	NOTES
				Sugar Creek & Eastway Station	Sugar Creek & Eastway Station	
TRANSPORTATION						
		2008 Base Year	**2030 No Build**	**2030 Build**	**2030 Build**	
Vehicle Travel Time (minutes)	AM	4.1 NB / 4.7 SB	4.9 NB / 10.0 SB	8.7 NB / 8.8 SB	16.6 NB / 12.7 SB	Based on VISSIM (Average vehicle travel time through the corridor)
	PM	4.5 NB / 3.6 SB	12.2 NB / 4.6 SB	19.9 NB / 11.1 SB	13.7 NB / 12.2 SB	
Intersection Delay (minutes)	AM	1.1	5.8	5.9	10.6	Based on VISSIM (Total delay of all 9 intersections)
	PM	1.3	7.3	11.4	9.6	
Vehicle Speed (mph)	AM	27 NB / 24 SB	24 NB / 11 SB	14 NB / 13 SB	8 NB / 9 SB	Based on VISSIM (Average speed of vehicle traveling through the corridor
	PM	25 NB / 31 SB	10 NB / 25 SB	6 NB / 13 SB	8 NB / 10 SB	
Intersections at LOS F	AM	None	Sugar Creek Road Wellingford Street Mellow Drive	Sugar Creek Road Wellingford Street	Sugar Creek Road Eastway Drive Old Concord Road Mellow Drive Bingham Drive Lambeth Drive	Based on VISSIM
	PM	None	Sugar Creek Road Wellingford Street Bingham Drive	Sugar Creek Road Wellingford Street Mellow Drive Bingham Drive Lambeth Drive	Sugar Creek Road Wellingford Street Mellow Drive Bingham Drive	
Intersections with Volume to Capacity Ratio Greater than 1.00	AM	Sugar Creek Road Orr Road	Sugar Creek Road Eastway Drive Old Concord Road Lambeth Drive Orr Road	Sugar Creek Road Eastway Drive Old Concord Road Lambeth Drive	Sugar Creek Road Eastway Drive Old Concord Road Wellingford Street Mellow Drive Bingham Drive Lambeth Drive Northchase Drive Orr Road	Based on SYNCHRO (The decrease in v/c in the AM Sugar Creek Design Option is due to unsignalized intersections losing their LT movement ability. The increase in v/c in the PM Sugar Creek Design Option is due to U-turns being added at Mellow Dr. The increase in v/c in the NCRR Alignment is because North Tryon would be limited to two lanes each way with LT's under the streetscape scenario)
	PM	Eastway Drive Orr Road	Sugar Creek Road Eastway Drive Old Concord Road Bingham Drive Lambeth Drive Orr Road	Sugar Creek Road Eastway Drive Old Concord Road Mellow Drive Bingham Drive Lambeth Drive Orr Road	Sugar Creek Road Eastway Drive Old Concord Road Wellingford Street Mellow Drive Bingham Drive Lambeth Drive Northchase Drive Orr Road	
Bike/Ped LOS		Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E	Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E	Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E	Bike: 3 intersections operate at LOS F Pedestrian: 1 intersection LOS F, 2 LOS E	Based on CDOT Bike/Ped analysis of 3 signalized intersections
Left Turn Access on N. Tryon Street		Existing driveway access	Existing driveway access	LT's restricted at 85 driveways and 6 intersections	LT restricted at 31 driveways	Number of driveway restrictions (NCRR includes N. Tryon Streetscape)
U-Turn Locations		U-turns allowed at all intersections	U-turns allowed at all intersections	U-Turns allowed at Sugar Creek Rd, Eastway Dr, Old Concord Rd, and Lambeth Dr	U-turns allowed at all intersections	

LYNX Blue Line Extension

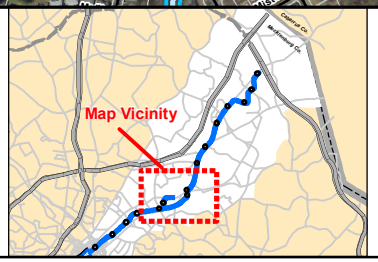
Figure 1

Environmental Analysis : Light Rail Alternative - NCRR (LPA)



Legend

- Proposed Light Rail Alternative
- Design Options
- Proposed Station Platforms
- Proposed Park-and-Ride Facilities
- Proposed Bridges
- Proposed Retaining Walls
- Historic Sites
- NCRR Right-of-Way
- EJ Community
- Vibration Monitoring Sites
- Streams
- Roads
- Lakes & Ponds
- Mecklenburg Wetlands
- FEMA Floodway Encroachment Area
- Community Floodplain Encroachment Area
- Community Floodplain Area
- Parcels



500 250 0 500

Feet

1 inch equals 1,000 feet

Data Source: Charlotte Area Transit System, STV/RWA, Mecklenburg County GIS Aerial (2007)

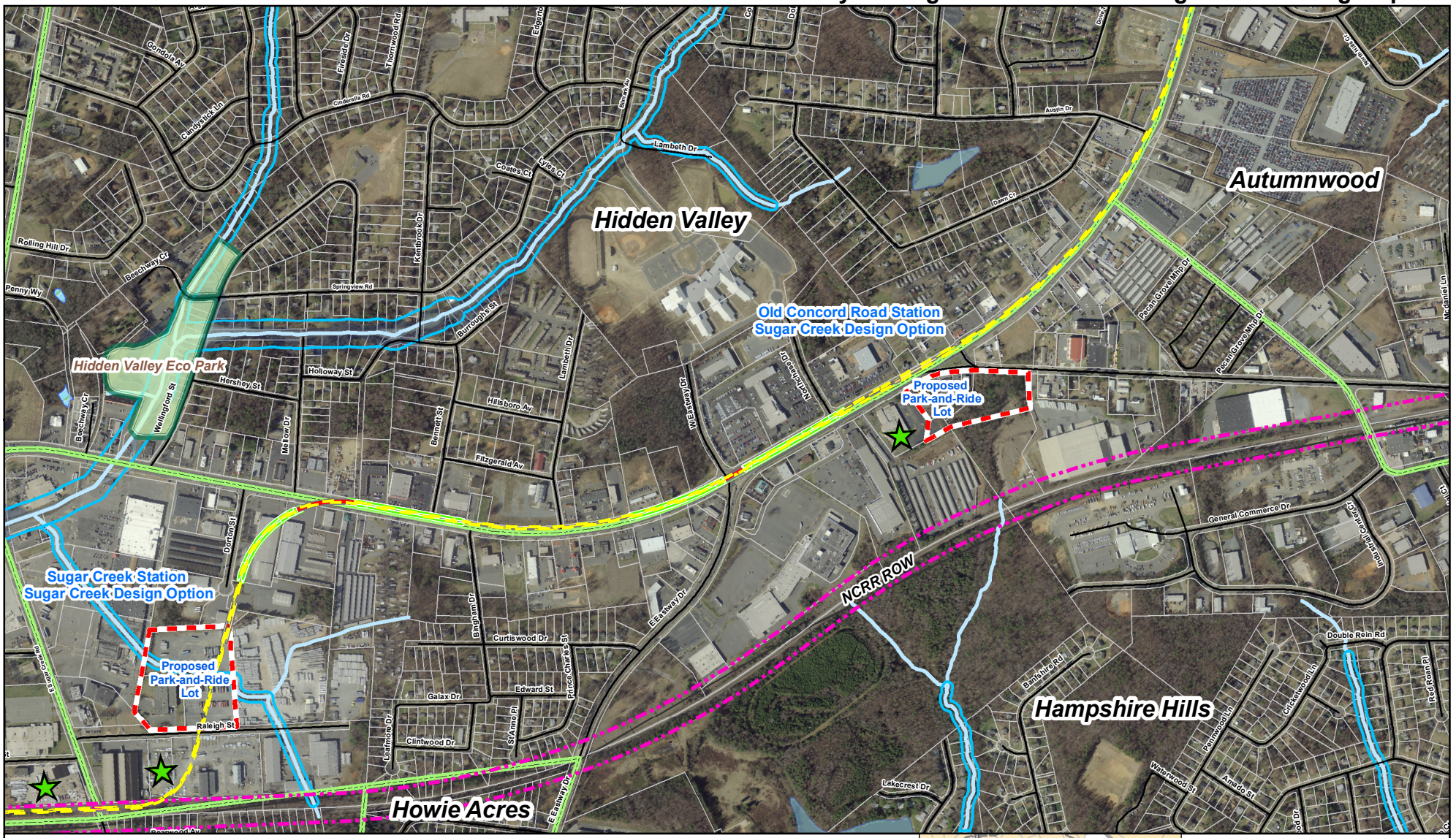
12.12.08

NCRR_PPT_Map_Rev00.pdf

LYNX Blue Line Extension

Figure 2

Environmental Analysis : Light Rail Alternative Sugar Creek Design Option



Legend

- Light Rail Transit
- Design Option
- Proposed Station Platforms
- Proposed Park-and-Ride Facilities
- Proposed Structures
- Proposed Retaining Walls
- Historic Sites
- NCRR Right-of-Way
- EJ Community
- Streams
- Roads
- Parcels
- Lakes & Ponds
- Mecklenburg Wetlands
- FEMA Floodway Encroachment Area
- Community Floodplain Encroachment Area
- Community Floodplain Area

500 250 0 500

Feet

1 inch equals 1,000 feet

Data Source: Charlotte Area Transit System, STV/RWA, Mecklenburg County GIS Aerial (2007)

12.12.08

SCDO_PPT_Map_Rev00.pdf

Appendix A: Acquisitions and Displacements Summary Tables

Light Rail Alternative – Sugar Creek Design Option: Full Property Acquisitions from Sugar Creek Road to Old Concord Road

PARCEL ID	PROPERTY OWNERS NAME	PHYSICAL ADDRESS	PROPERTY USE	TOTAL SF AREA	Property Tax Value (2003)	Property Tax Revenue (2008)	Displacement
09105113	Joal Corporation	4237 Raleigh St.	Industrial	127,195	$945,900	$12,271.16	Yes
09105125	Michael Thornburg and Thomas Collins	4311 Raleigh St.	Industrial	342,686	$342,700	$4,534.76	Yes
09105144	Starnes Pallet Service, Inc.	150 Dorton St.	Industrial	48,599	$651,600	$8,453.21	Yes
09105133	Lions Services/Army Navy Union/ Carpet Palace	4600 N. Tryon St.	Commercial	183,387	$218,400	$2,833.30	Yes
08902106	AMT International LLC	4725 N. Tryon St.	Industrial	82,067	$457,200	$6,094.37	Yes
08911103	William Lee Wallace	5101 N. Tryon St.	Vacant	18,519	$141,400	$1,834.38	Yes
09711117	MSC Thunderbird LLC	5448 N. Tryon St.	Industrial	450,410	$3,450,200	$44,759	Yes
09711105	John Dross	5542 N. Tryon St.	Commercial	72,093	$368,500	$4,780.55	Yes
08912101	Aristidis Katopodis	5541 N. Tryon St.	Commercial	17,850	$104,000	$1,386.29	Yes
08920123	TDK, Inc.	5605 N. Tryon St.	Commercial	28,728	$432,800	$5,614.71	Yes
09711106	Tagazar Import Export	5600 Old Concord Rd.	Commercial	13,552	$122,600	$1,590.49	Yes
09711107	Hosam Banawan	5608 Old Concord Rd.	Industrial	13,111	$90,800	$1,177.95	Yes
09711108	Abdul H. Motan	5612 Old Concord Rd.	Industrial	14,854	$185,000	$2,400.01	Yes
08920124	TDK, Inc.	5625 N. Tryon St.	Commercial	29,904	$255,900	$3,319.79	Yes
04901101	Buzz Sinnett	5636 N. Tryon St.	Commercial	43,560	$175,000	$2,339.37	Yes
09711138	Robert E. Lanier	Old Concord Rd.	Vacant	409,333	$382,900	$4,967.36	No

Source: City of Charlotte Department of Real Estate Management.

Light Rail Alternative – Sugar Creek Design Option: Partial Property Acquisitions from Sugar Creek Road to Old Concord Road

PID	PROPERTY OWNERS NAME	PHYSICAL ADDRESS	PROPERTY USE	TOTAL SF AREA	SF AREA TAKEN	PERCENT OF TOTAL AREA
09107204	Brownstone Properties LLC	600 E. Sugar Creek Rd.	Industrial	262,231	608	0.2%
09105151	Industrial Solutions of Charlotte LLC	E. Sugar Creek Rd.	Vacant	179,031	669	0.4%
09105138	Contech Construction Products Inc	601 E. Sugar Creek Rd.	Industrial LG Office	79,061	9,330	11.8%
09105137	Contech Construction Products Inc	4242 Raleigh St.	Industrial	282,486	30,219	10.7%
09105112	Dennis Gaines	4357 Raleigh St.	Office Industrial	510,523	984	0.2%
09105143	Lions Services Inc	151 Dorton St.	Industrial	178,596	15,480	8.7%
09105119	Cregger Capital Investments Inc	4700 N. Tryon St.	Industrial	202,989	14,487	7.1%
08901607	SBKFC Holdings Inc	4601 N. Tryon St.	Commercial	30,000	1,186	4.0%
08901634	SBKFC Holdings LLC	4609 N. Tryon St.	Vacant	29,969	1,756	5.9%
08901633	Frederick Brillante	4617 N. Tryon St.	Industrial	30,000	2,551	8.5%
08901609	RJR Investment LLC	4635 N. Tryon St.	Commercial	53,700	6,536	12.2%
08902105	Carolina Lighting Supply Inc	4701 N. Tryon St. 4705 N. Tryon St.	Commercial	56,800	8,863	15.6%
09105111	ABC Board Mecklenburg County	4706 N. Tryon St.	Commercial	32,076	518	1.6%
08902304	Giuseppe Brucia	4801 N. Tryon St.	Commercial	60,417	9,310	15.4%
08902305	Pep Boys	4837 N. Tryon St.	Commercial	111,078	16,412	14.8%
08902501	Eugene Kim	4901 N. Tryon St.	Office Industrial	112,515	12,104	10.8%
09105107	Winfield Co Inc	4926 N. Tryon St.	Commercial	54,000	1,106	2.0%
08902506	Eugene Kim	5001 N. Tryon St.	Vacant	13,620	3,987	29.3%
08902504	Eugene Kim	5005 N. Tyron St.	Industrial	13,500	4,170	30.9%
09101101	Truck Drivers Union AFL #71	5000 N. Tryon St.	Commercial	62,726	1,130	1.8%
08902505	Ganam Investments LLC	5037 N. Tryon St.	Office Industrial	170,319	31,834	18.7%
08911104	William Lee Wallace	5115 N. Tryon St.	Commercial	107,593	15,091	14.0%
09101131	Jose Bautista	5130 N. Tryon St.	Commercial	165,092	102	0.1%

PID	PROPERTY OWNERS NAME	PHYSICAL ADDRESS	PROPERTY USE	TOTAL SF AREA	SF AREA TAKEN	PERCENT OF TOTAL AREA
09101135	Auto Zone Inc	5136 N. Tryon St.	Commercial	24,829	387	1.6%
08911113	Chesley Dellinger	5135 N. Tryon St.	Industrial	50,094	6,777	13.5%
09101122	Guy Properties	5210 N. Tryon St.	Commercial	84,942	1,213	1.4%
08911105	Karl Park	5205 N. Tryon St.	Industrial	117,786	14,106	12.0%
09101121	SMH Properties I LLC	5220 N. Tryon St.	Commercial	47,480	2,536	5.3%
08911106	Big Properties LLC	5217 N. Tryon St.	Single-Family	84,506	11,109	13.1%
09101130	Panagiotis Koutsoupias	130 Eastway Dr.	Commercial	38,071	1,850	4.9%
09101128	Meineke Discount Mufflers	5300 N. Tryon St.	Industrial	21,311	7,589	35.6%
08911111	Nancy Starrette	5301 N. Tryon St.	Vacant	352,836	11,067	3.1%
08912105	Young Ford Inc.	5411 N. Tryon St.	Industrial	366,296	26,133	7.1%
08912104	Young Ford Inc.	5331 N. Tryon St.	Vacant	81,936	11,319	13.8%
08912108	DCM Properties LLC	110 Northchase Dr.	Industrial	214,228	30,161	14.1%
09711104	Crossroads Charter	5500 N. Tryon St.	Office	72,093	61	0.1%
08920102	Bakis Associates Inc	5655 N. Tryon St.	Commercial	28,749	5,025	17.5%
08920104	Glenn Cline	5703 N. Tryon St.	Commercial	179,467	5,472	3.0%
04901109	Donald Killian	5716 N. Tryon St.	Commercial Industrial	43,560	151	0.3%
08920105	Ali Darwich	5735 N. Tryon St.	Office	73,616	1,983	2.7%
04901117	WKTC Radio Corp	5732 N. Tryon St.	Office	20,000	802	4.0%
08920106	Peter Couchell	5745 N. Tyron St.	Industrial	77,101	3,890	5.0%
04901103	North Tryon Holdings LLC	5734 N. Tryon St. 5736 N. Tryon St.	Industrial	80,586	411	0.5%
04901108	Engine Service Products Inc	5740 N. Tryon St.	Commercial Industrial	15,750	940	6.0%
04901107	JD & RG Faulk	5744 N. Tryon St.	Industrial	47,916	1,446	3.0%
04901120	Storage Trust Properties LP	5748 N. Tryon St.	Industrial	162,914	846	0.5%
08920122	Harvey Gouch	5753 N. Tryon St.	Industrial	25,344	2,298	9.1%
04901112	Wright's Pecan Grove Mobile Home Park Ltd Ptn	5800 N. Tryon St.	Vacant	102,801	3,608	3.5%
08920125	Harvey W Gouch	5801 N. Tryon St.	Industrial	75,271	1,443	1.9%

PID	PROPERTY OWNERS NAME	PHYSICAL ADDRESS	PROPERTY USE	TOTAL SF AREA	SF AREA TAKEN	PERCENT OF TOTAL AREA
08920301	Leonard Harrell Davis	5901 N. Tryon St.	Commercial Single-Family Industrial	28,365	3,183	11.2%
04902105	iStar Bowling Centers II L P	5900 N. Tryon St.	Commercial	101,930	2,478	2.4%
08920302	Girish Patel	5911 N. Tryon St.	Hotel/Motel	45,900	3,330	7.3%
08920303	David L Williams	5925 N. Tryon St., Unit #A	Commercial	57,950	5,665	9.8%
08923114	Jagdish Patel	6001 N. Tryon St.	Hotel/Motel	69,783	10,174	14.6%
08923101	Adams Construction Group Inc	6027 N. Tryon St.	Vacant	264,844	11,761	4.4%

Source: City of Charlotte Department of Real Estate Management.

Light Rail Alternative: Full Property Acquisitions from Sugar Creek Road to Old Concord Road

PARCEL ID	PROPERTY OWNERS NAME	PHYSICAL ADDRESS	PROPERTY USE	TOTAL AREA (SQUARE FEET	DISPLACEMENT	PURPOSE OF ACQUISITION
09107104	Ark Promotions	530 East Sugar Creek Road	Industrial	218,671	Yes	Park-and -Ride
09105116	Helen Dorton, LLC	501 East Sugar Creek Road	Commercial-Industrial	86,600	Yes	Park-and-Ride
09105140	Economy Transport Group, Inc.	421 East Sugar Creek Road	Commercial	79,540	Yes	Park-and Ride
09711117	MSC Thunderbird LLC	5448 North Tryon Street	Industrial	450,410	Yes	Park-and Ride
09711138	Robert E. Lanier	Old Concord Road	Vacant	409,333	No	Park-and Ride
09711105	John Dross	5542 North Tryon Street	Commercial	72,093	Yes	Park-and Ride
09711106	Tagazar Import Export	5600 Old Concord Road	Commercial	13,552	Yes	Park-and Ride
09711107	Hosam Banawan	5608 Old Concord Road	Industrial	13,111	Yes	Park-and Ride
09711108	Abdul H. Motan	5612 Old Concord Road	Industrial	14,854	Yes	Park-and Ride
04901101	Buzz Sinnett	5636 North Tryon Street	Commercial	43,560	Yes	Alignment
04901117	WKTC Radio Corp	5732 North Tryon Street.	Office	20,000	Yes	Alignment
04901108	Engine Service Products, Inc.	5740 North Tryon Street	Commercial-Industrial	15,750	Yes	Street Widening

Source: City of Charlotte Department of Real Estate Management.

Light Rail Alternative: Partial Property Acquisitions from Sugar Creek Road to Old Concord Road

PARCEL ID	PROPERTY OWNERS NAME	PHYSICAL ADDRESS	PROPERTY USE	TOTAL AREA (SQUARE FEET)	PROPOSED ACQUISITION (SQUARE FEET)	PERCENT OF TOTAL AREA	DISPLACEMENT	PURPOSE OF ACQUISITION
09107204	Brownstone Properties x LLC	600 East Sugar Creek Road	Industrial	262,231	4,529	1.7%	No	Park-and-Ride
09713115	Da Dai Mai	301 Eastway Drive	Vacant	305,791	16,736	5.5%	No	Railroad ROW Widening
09711120	ABI North Park LP	103 Eastway Drive	Commercial	560,181	2,411	0.4%	No	Railroad ROW Widening
09711128	NRG-Hampshire Hills LLC	5420 North Tryon Street 5430 North Tryon Street	Commercial	390,733	15,175	3.9%	No	Alignment
09711104	Crossroads Charter High School	5500 North Tryon Street	Office	166,791	9,633	5.8%	No	Alignment
08920123	TDK Inc	5605 North Tryon Street	Commercial	28,728	2,486	8.7%	No	Street Widening
08920124	TDK Inc	5625 North Tryon Street	Commercial	29,904	1,251	4.2%	No	Street Widening
08920101	TDK Inc	5635 North Tryon Street	Industrial	354,143	85	0.0%	No	Street Widening
04901110	Sinkoe Brothers	5700 North Tryon Street	Vacant	85,377	354	0.4%	No	Street Widening
08920102	Bakis Associates INC	5655 North Tryon Street	Commercial	28,749	3,361	11.7%	Yes	Street Widening
08920104	Glenn Cline	5703 North Tryon Street	Commercial	179,467	10,539	5.9%	No	Street Widening
04901109	Donald Wilson Killian	5716 North Tryon Street	Commercial Industrial	43,560	143	0.3%	Yes	Street Widening
08920105	Ali Darwich	5735 North Tryon Street	Office	73,616	2,250	3.1%	No	Street Widening
04901103	North Tryon Holdings LLC	5734 North Tryon Street 5736 North Tryon Street	Industrial	80,586	417	0.5%	No	Street Widening
08920106	Peter J Couchel	5745 North Tryon Street	Industrial	77,101	4,070	5.3%	No	Street Widening
04901107	JD & RG Faulk	5744 North Tryon Street	Industrial	47,916	1,449	3.0%	No	Street Widening
04901120	Storage Trust	5748 North Tryon	Industrial	162,914	848	0.5%	No	Street Widening

	Properties L P	Street						
08920122	Harvey W Gouch	5753 North Tryon Street	Industrial	25,344	2,299	9.1%	No	Street Widening
04901112	Wright's Pecan Grove Mobile Home Park Ltd Ptn	5800 North Tryon Street	Vacant	102,801	3,608	3.5%	No	Street Widening
08920125	Harvey W Gouch	5801 North Tryon Street	Industrial	75,271	1,443	1.9%	No	Street Widening
08920301	Leonard Harrell Davis	5901 North Tryon Street	Commercial Single-Family Industrial	28,365	3,183	11.2%	No	Street Widening
04902105	iStar Bowling Centers II L P	5900 North Tryon Street	Commercial	101,930	1,843	1.8%	No	Street Widening
08920302	Girish Patel	5911 North Tryon Street	Commercial (Hotel/Motel)	45,900	3,330	7.3%	No	Street Widening
08920303	David L Williams	5925 North Tryon Street, Unit A	Commercial	57,950	5,665	9.8%	No	Street Widening
08923114	Jagdish Patel	6001 North Tryon Street	Commercial (Hotel/Motel)	69,783	10,174	14.6%	No	Street Widening
08923101	Adams Construction Group Inc	6027 North Tryon Street	Vacant	264,844	11,707	4.4%	No	Street Widening

Source: City of Charlotte Department of Real Estate Management.

Appendix B: North Tryon Street/US-29 Streetscape Traffic Analysis Tech Memos

The Streetscape Alternative includes several changes to existing North Tryon Street between Sugar Creek Road and Old Concord Road. The roadway will be limited to a four-lane section. Bike lanes, planting strips and sidewalk will be included along both sides of the roadway. Medians will be constructed in place of the existing two-way center left turn lane. The medians will not block any existing intersections but will restrict driveways to right-in / right-out access only.

The Streetscape Alternative also includes some changes to the North Tryon Street and Eastway Drive intersection. The southbound right turn lane will be removed. Right turn movements will instead be allowed from the southbound shared through/right turn lane. The northbound channelized right turn lane will also be changed. The channelization will remain but the storage length will be removed. Right turn movements will be allowed from the northbound shared through/right turn lane.

Six scenarios were modeled in Synchro 7.0 to analyze the Streetscape Alternative:

- 2007 Existing Conditions
- 2007 Full Streetscape Alternative
- 2030 Existing Conditions
- 2030 Full Streetscape Alternative

The AM and PM peak hours were modeled for each scenario. The signal phasing in each scenario was optimized except for 2007 Existing Conditions. The 2007 traffic volumes were grown using a 1.30 growth factor to obtain the 2030 growth volumes.

In general, the Streetscape Alternative will increase delay along North Tryon Street. The Streetscape Alternative will remove existing through lanes, shorten storage lengths, and remove turn lanes. This decreases the capacity of the intersections along North Tryon Street. The following tables summarize the measures of effectiveness for each scenario.

Intersection	Measure of Effectiveness	AM Peak			
		2007 existing	2007 w/ Streetscape w/ Eastway	2030 existing	2030 w/ Streetscape w/ Eastway
Sugar Creek	v/c ratio	1.17	1.20	1.54	1.54
	LOS	F	F	F	F
	Delay (sec)	149.9	133.5	237.5	237.5
Beechway	v/c ratio (max)	0.50	0.83	0.65	1.08
	LOS	F	F	F	F
	Delay (sec)	59.5	59.8	171.5	174.2
Wellingford	v/c ratio (max)	0.49	0.82	0.94	1.13
	LOS	E	F	F	F
	Delay (sec)	39.1	51.1	190.5	274.1
Dorton	v/c ratio (max)	0.50	0.83	0.65	1.08
	LOS	F	F	F	F
	Delay (sec)	52.1	52.1	85.8	117.1
Mellow	v/c ratio (max)	0.49	0.82	0.69	1.06
	LOS	D	E	F	F
	Delay (sec)	29.5	40.1	93.5	160.1
Bennett	v/c ratio (max)	1.37	1.43	4.41	4.57
	LOS	F	F	F	F
	Delay (sec)	330.3	359.2	-	-
Bingham	v/c ratio (max)	0.63	0.84	0.82	1.10
	LOS	C	D	F	F
	Delay (sec)	23.8	29.7	51.6	81.6
Lambeth	v/c ratio (max)	0.65	0.84	466.83	464.96
	LOS	F	F	F	F
	Delay (sec)	57.4	58.5	-	-
Eastway	v/c ratio	0.85	0.83	1.07	1.07
	LOS	C	C	D	D
	Delay (sec)	31.0	28.2	47.9	49.0
Northchase	v/c ratio (max)	0.55	0.92	0.72	1.28
	LOS	C	E	F	F
	Delay (sec)	19.7	35.4	50.0	372.8
Old Concord	v/c ratio	0.90	0.90	1.16	1.16
	LOS	C	C	E	E
	Delay (sec)	27.1	26.2	66.5	66.5

Intersection	Measure of Effectiveness	PM Peak			
		2007 existing	2007 w/ Streetscape w/ Eastway	2030 existing	2030 w/ Streetscape w/ Eastway
Sugar Creek	v/c ratio	0.93	0.93	1.21	1.21
	LOS	E	E	F	F
	Delay (sec)	69.3	55.8	115.7	115.7
Beechway	v/c ratio (max)	0.71	30.31	-	-
	LOS	F	F	F	F
	Delay (sec)	242.9	-	-	-
Wellingford	v/c ratio (max)	0.71	0.95	0.92	1.23
	LOS	F	F	F	F
	Delay (sec)	61.4	142.3	312.7	602.4
Dorton	v/c ratio (max)	0.94	0.94	2.77	2.78
	LOS	F	F	F	F
	Delay (sec)	191.9	192.6	1271.4	1273.1
Mellow	v/c ratio (max)	0.70	0.92	0.91	1.20
	LOS	F	F	F	F
	Delay (sec)	81.1	81.1	251.4	251.4
Bennett	v/c ratio (max)	0.91	0.91	1.78	1.88
	LOS	F	F	F	F
	Delay (sec)	70.0	81.2	471.9	524.2
Bingham	v/c ratio (max)	0.69	0.86	12.43	12.44
	LOS	F	F	F	F
	Delay (sec)	101.7	102.6	-	-
Lambeth	v/c ratio (max)	0.82	0.86	-	-
	LOS	F	F	F	F
	Delay (sec)	127.0	128.9	-	-
Eastway	v/c ratio	1.07	1.07	1.39	1.39
	LOS	F	D	F	F
	Delay (sec)	104.3	50.2	129.1	129.6
Northchase	v/c ratio (max)	0.57	0.80	0.74	1.05
	LOS	C	C	F	F
	Delay (sec)	23.1	21.1	93.6	93.6
Old Concord	v/c ratio	0.90	0.89	1.18	1.18
	LOS	E	B	E	E
	Delay (sec)	59.9	19.2	62.2	62.2

Three items were identified with the initial Streetscape analysis that required further investigation. (1) The N. Tryon St. & Eastway Dr. intersection should be modeled as a three-leg and four-leg intersection to determine the best configuration. This is a concern since the existing configuration allows free-flowing movements on the westbound approach as well as the eastbound right turn lane and northbound right turn lane. This makes it difficult for pedestrians to cross since gaps are not provided on these movements. (2) The signalized intersections in the 2008 existing conditions should not show a v/c ratio greater than 1.0. CDOT indicated that previous analyses and field investigation did not indicate that these intersections were operating over capacity. (3) For the signalized intersections with a v/c ratio that exceeds 1.0 in any condition, 15-minute analyses should be performed to determine the time and duration in which these intersections operate over capacity.

(1) Analyses were performed for both a three-leg and four-leg intersection to determine the operations for each condition. Under the three-leg configuration, the eastbound, westbound and northbound approaches operate under signal control with the southbound approach becoming right-in/right-out. All channelization is removed forming a more traditional T intersection. Also the northbound approach will have dual left turn lanes and an exclusive right turn lane. Under the four-leg configuration, the intersection will have the same geometry as the three-leg configuration with the southbound approach becoming a full movement approach under signal control. A left turn lane would be constructed on the eastbound approach. The channelized right turn lane on the northbound approach would become a shared through/right turn lane. Tables 1 and 2 show the measures of effectiveness for these three scenarios. Figures 1 and 2 show the lane geometry for the three-leg and four-leg configurations.

From these analyses it is evident that the existing configuration operates most efficiently for vehicle maneuvers. By adding phases to the signal and stopping the free-flowing movements, the intersection experiences more delay, as expected. However, the three-leg and four-leg configurations would provide a safer method to allow pedestrians to cross through the intersection.

(2) The higher v/c ratios shown in the Streetscape analyses versus previous analyses is a product of the method of balancing the volumes throughout the corridor as instructed by CDOT. In previous meetings with CDOT it was instructed when balancing the volumes throughout the corridor all volumes should be increased to reach the adjacent intersections, no volumes should be decreased. This in effect has increased the volumes throughout the corridor which causes the v/c ratio to increase as well. This is the reason the Streetscape analyses have somewhat higher volumes than what field conditions or previous analyses would indicate.

(3) All three signalized intersections were analyzed in 15-minute periods for the peak hour and the hour following the peak hour. This analysis shows which periods operate at a v/c ratio greater than 1.0 to identify the time and duration of the over capacity condition. For cases where the first 15-minute period had a v/c ratio greater than 1.0, prior 15-minute periods were analyzed until the v/c ratio was less than 1.0. Tables 3

through 10 show the results of the 15-minute interval analyses. The highlighted 15-minute periods indicate the peak hour and the highlighted measures of effectiveness indicate a v/c ratio greater than 1.0. The 2008 analyses show that only one 15-minute period in the PM peak hour has a v/c ratio greater than 1.0 in both the existing conditions and with the Streetscape.

In the 2030 analyses, there are several 15-minute periods with v/c ratios greater than 1.0. For the AM period, the 15-minute periods with v/c ratios greater than 1.0 are the same except the existing conditions has one additional period during the 8:00 a.m. interval at the Eastway Drive intersection. During the PM period, the intervals with a v/c ratio greater than 1.0 are similar as well except for the 4:15 p.m. interval in the existing condition and the 6:15 p.m. interval with the Streetscape. Both scenarios show significant periods with v/c ratios over 1.0, especially at the Eastway Drive intersection during the PM period.

Table 1: AM Peak Analyses

Intersection	Measure of Effectiveness	AM Peak							
		2008 existing	2008 w/ Streetscape (Glatting Jackson)	2008 w/ Streetscape 3-leg Eastway	2008 w/ Streetscape 4-leg Eastway	2030 existing	2030 w/ Streetscape (Glatting Jackson)	2030 w/ Streetscape 3-leg Eastway	2030 w/ Streetscape 4-leg Eastway
Eastway	v/c ratio	0.85	0.83	0.70	0.88	1.07	1.07	1.01	1.28
	LOS	C	C	D	D	D	D	E	F
	Delay (sec)	31.0	27.8	36.6	45.0	47.9	49.0	75.2	137.3

Table 2: PM Peak Analyses

Intersection	Measure of Effectiveness	PM Peak							
		2008 existing	2008 w/ Streetscape (Glatting Jackson)	2008 w/ Streetscape 3-leg Eastway	2008 w/ Streetscape 4-leg Eastway	2030 existing	2030 w/ Streetscape (Glatting Jackson)	2008 w/ Streetscape 3-leg Eastway	2008 w/ Streetscape 4-leg Eastway
Eastway	v/c ratio	1.07	1.07	1.10	1.25	1.39	1.39	1.49	1.62
	LOS	F	D	F	F	F	F	F	F
	Delay (sec)	104.3	50.2	115.4	114.6	129.1	129.6	235.5	225.8

*All analyses were performed using the balanced volumes for consistency.

Figure 1: Three-leg Configuration

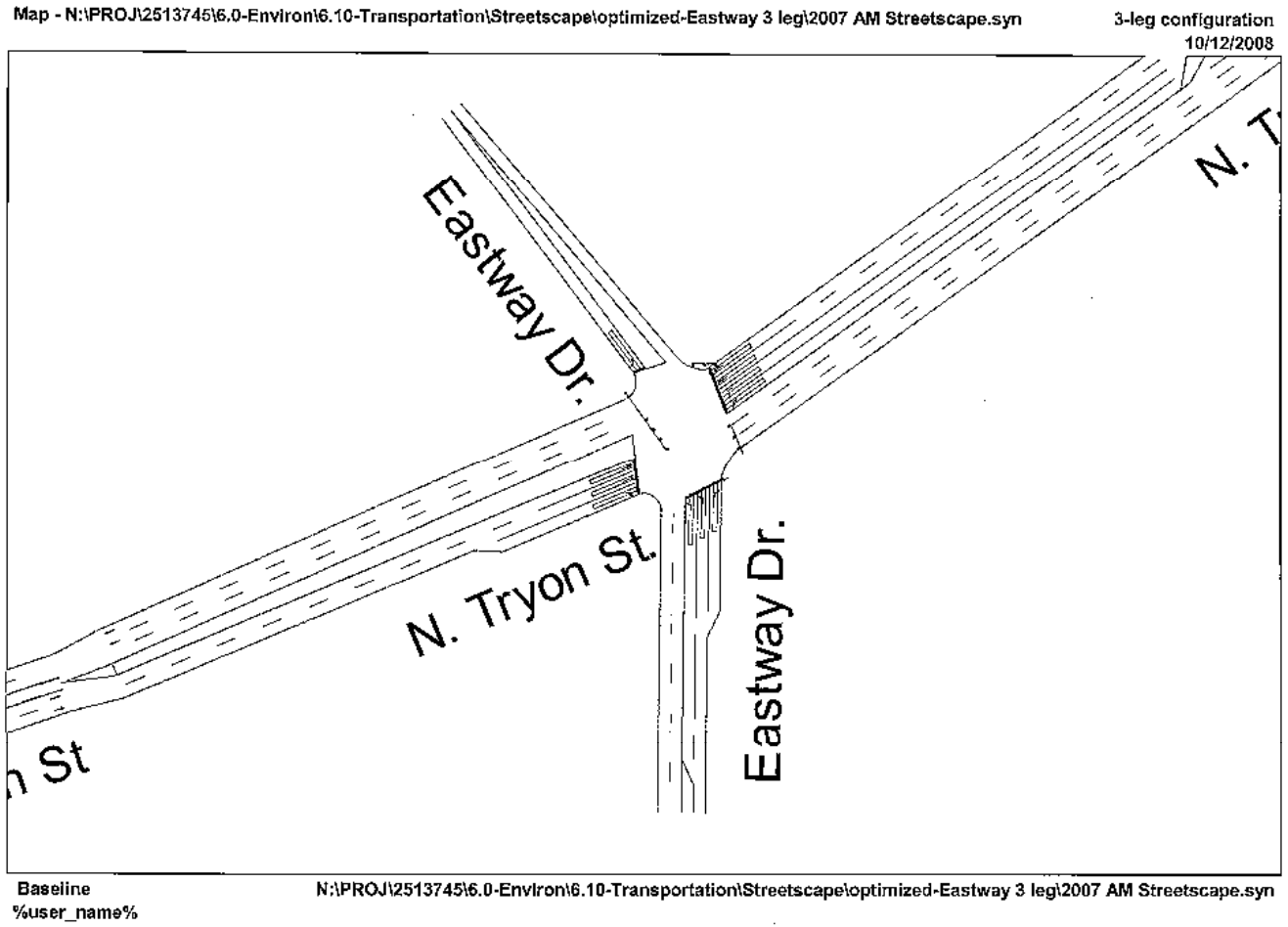


Figure 2: Four-leg Configuration

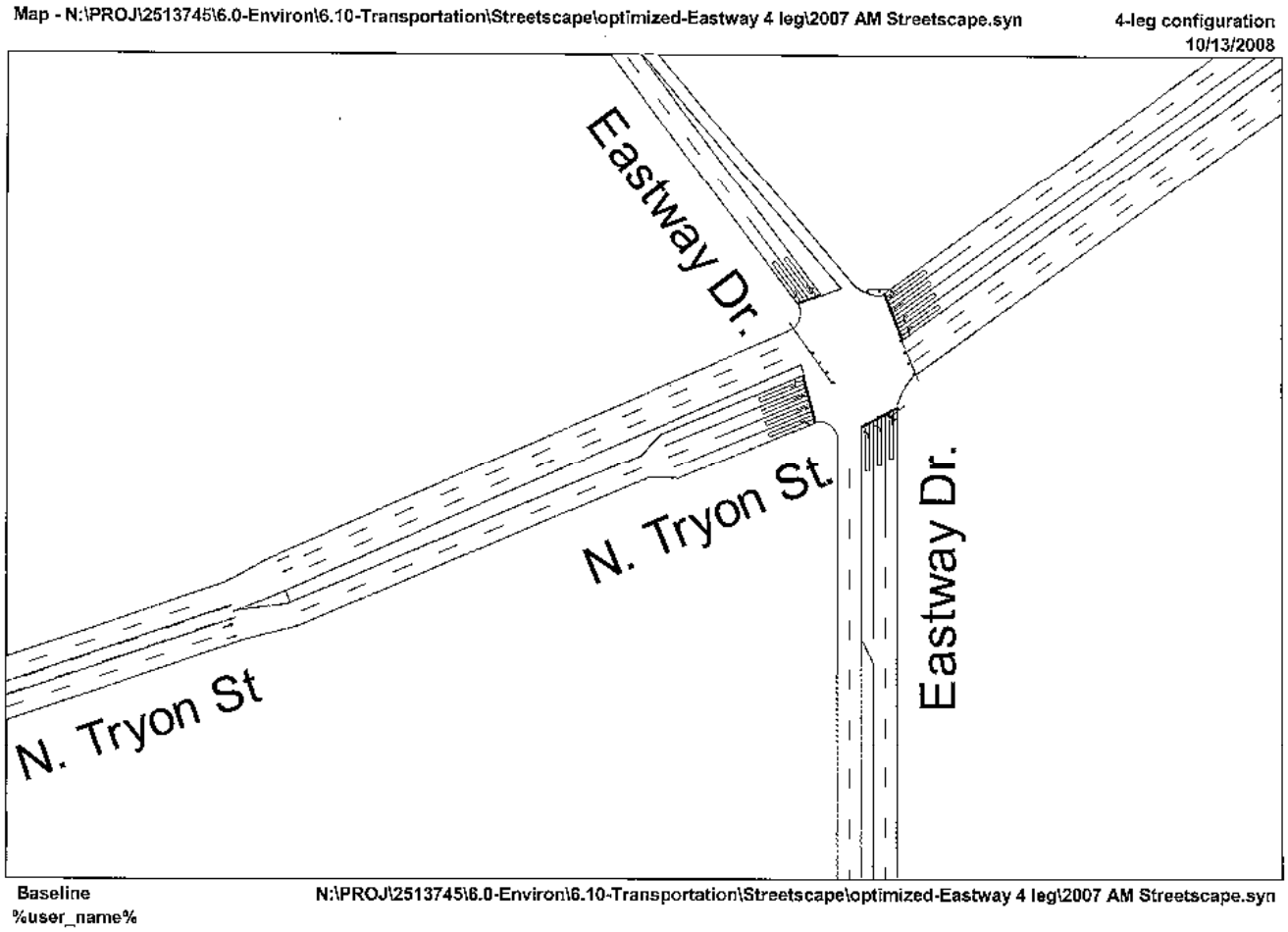


Table 3: 2008 AM Existing Conditions

Intersection	Measure of Effectiveness	AM Period							
		7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
Sugar Creek	v/c ratio	0.78	0.80	0.70	0.75	0.60	0.49	0.38	0.53
	LOS	E	D	D	D	D	C	C	D
	Delay (sec)	76.6	42.2	41.3	41.2	36.0	34.7	33.9	37.7
Eastway	v/c ratio	0.76	0.81	0.71	0.67	0.65	0.65	0.63	0.59
	LOS	C	C	C	C	C	C	C	C
	Delay (sec)	26.7	31.5	23.6	23.2	22.5	22.8	23.7	24.0
Old Concord	v/c ratio	0.80	0.82	0.85	0.71	0.57	0.63	0.46	0.43
	LOS	C	C	C	C	C	C	C	B
	Delay (sec)	26.4	27.9	31.5	24.9	23.1	24.2	20.1	19.9

Table 4: 2008 PM Existing Conditions

Intersection	Measure of Effectiveness	PM Period							
		4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
Sugar Creek	v/c ratio	0.52	0.59	0.62	0.79	0.61	0.67	0.63	0.67
	LOS	D	D	D	E	D	D	D	D
	Delay (sec)	36.3	40.3	37.4	64.5	39.7	44.3	42.2	42.8
Eastway	v/c ratio	0.84	0.96	0.92	1.02	0.88	0.70	0.64	0.60
	LOS	E	F	F	F	F	C	D	C
	Delay (sec)	65.7	86.3	92.1	108.6	101.4	24.0	37.9	34.9
Old Concord	v/c ratio	0.67	0.66	0.74	0.73	0.54	0.66	0.70	0.49
	LOS	C	C	D	D	C	B	C	C
	Delay (sec)	26.2	21.6	44.0	40.7	22.1	15.7	29.6	22.1

Table 5: 2008 AM Streetscape

Intersection	Measure of Effectiveness	AM Period							
		7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
Sugar Creek	v/c ratio	0.80	0.78	0.71	0.73	0.59	0.48	0.38	0.54
	LOS	F	E	D	E	D	D	C	D
	Delay (sec)	123.0	55.9	49.4	55.8	36.9	35.1	34.3	39.8
Eastway	v/c ratio	0.73	0.79	0.72	0.68	0.66	0.66	0.62	0.60
	LOS	C	C	C	C	C	C	C	C
	Delay (sec)	27.1	28.6	26.4	24.8	23.8	24.2	26.4	27.5
Old Concord	v/c ratio	0.78	0.82	0.85	0.71	0.57	0.63	0.46	0.43
	LOS	E	E	E	C	B	B	C	B
	Delay (sec)	58.6	68.4	72.6	32.9	16.9	19.3	20.9	13.7

Table 6: 2008 PM Streetscape

Intersection	Measure of Effectiveness	PM Period							
		4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
Sugar Creek	v/c ratio	0.53	0.60	0.61	0.82	0.60	0.61	0.60	0.66
	LOS	D	D	D	E	D	D	D	D
	Delay (sec)	35.6	39.4	37.9	60.7	38.3	43.4	44.9	43.9
Eastway	v/c ratio	0.87	0.96	0.92	1.02	0.88	0.70	0.62	0.57
	LOS	C	D	D	D	D	C	C	C
	Delay (sec)	31.7	38.5	35.5	46.5	35.5	23.5	22.0	21.2
Old Concord	v/c ratio	0.67	0.66	0.67	0.65	0.56	0.67	0.55	0.49
	LOS	B	B	B	B	B	B	B	B
	Delay (sec)	13.3	14.6	13.1	13.9	11.3	12.6	12.4	12.3

Table 7: 2030 AM Existing Conditions

Intersection	Measure of Effectiveness	AM Period								
		7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
Sugar Creek	v/c ratio	0.91	1.02	1.04	0.91	0.97	0.78	0.64	0.50	0.69
	LOS	F	F	F	E	E	D	D	D	D
	Delay (sec)	81.4	144.2	80.8	68.9	71.7	40.3	37.8	35.7	45.0
Eastway	v/c ratio	0.83	0.99	1.06	1.03	0.88	0.85	0.85	0.82	0.77
	LOS	D	D	D	D	C	C	C	C	C
	Delay (sec)	41.7	40.1	53.8	48.5	29.8	28.0	28.3	28.4	28.9
Old Concord	v/c ratio	0.89	1.04	1.07	1.10	0.92	0.84	0.83	0.59	0.56
	LOS	C	D	E	E	D	C	D	C	C
	Delay (sec)	30.7	49.3	57.7	74.8	38.2	32.9	35.6	22.5	23.0

Table 8: 2030 PM Existing Conditions

Intersection	Measure of Effectiveness	PM Period										
		4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
Sugar Creek	v/c ratio	0.61	0.61	0.87	0.67	0.77	0.81	1.03	0.80	0.87	0.81	0.87
	LOS	D	D	E	D	D	D	F	D	E	D	E
	Delay (sec)	38.0	37.9	58.5	43.1	52.5	45.9	118.5	52.3	59.0	54.6	57.5
Eastway	v/c ratio	0.91	1.01	1.04	1.09	1.25	1.20	1.32	1.14	0.91	0.83	0.78
	LOS	D	F	F	F	F	F	F	F	D	F	E
	Delay (sec)	54.2	86.0	105.5	126.0	155.5	162.4	185.4	176.7	37.7	84.2	79.8
Old Concord	v/c ratio	0.65	1.06	1.40	0.87	0.86	0.97	0.95	0.70	0.85	0.91	0.66
	LOS	C	F	F	E	D	F	F	D	C	F	C
	Delay (sec)	24.3	197.1	285.9	69.3	41.5	110.5	128.5	48.5	22.4	83.4	32.9

Table 9: 2030 AM Streetscape

Intersection	Measure of Effectiveness	AM Period								
		7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
Sugar Creek	v/c ratio	0.93	1.04	1.02	0.93	0.95	0.76	0.63	0.49	0.70
	LOS	F	F	F	F	F	D	D	D	D
	Delay (sec)	122.6	205.4	109.6	90.9	106.4	45.2	39.0	36.5	50.2
Eastway	v/c ratio	0.78	0.94	1.03	0.94	0.89	0.85	0.86	0.81	0.78
	LOS	C	D	D	D	C	C	C	D	D
	Delay (sec)	29.6	42.3	50.1	40.8	33.5	29.9	30.8	38.8	42.8
Old Concord	v/c ratio	0.87	1.02	1.07	1.10	0.92	0.74	0.83	0.59	0.56
	LOS	D	F	F	F	E	C	C	C	B
	Delay (sec)	50.7	107.3	123.2	131.0	64.7	21.5	29.4	29.8	15.2

Table 10: 2030 PM Streetscape

Intersection	Measure of Effectiveness	PM Period										
		4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
Sugar Creek	v/c ratio	0.62	0.57	0.85	0.68	0.78	0.79	1.06	0.78	0.80	0.78	0.86
	LOS	D	D	E	D	D	D	F	D	E	E	E
	Delay (sec)	39.0	38.1	57.2	38.8	46.3	45.4	128.2	44.5	59.2	57.9	56.1
Eastway	v/c ratio	0.91	1.01	1.06	1.13	1.25	1.20	1.32	1.14	0.91	0.80	0.75
	LOS	C	D	E	E	F	F	F	F	C	C	C
	Delay (sec)	34.0	44.1	64.2	76.8	100.3	93.3	114.4	89.5	34.5	29.9	27.0
Old Concord	v/c ratio	0.65	0.98	1.44	0.85	0.87	0.87	0.84	0.73	0.87	1.08	0.63
	LOS	B	E	F	B	C	C	C	B	C	C	B
	Delay (sec)	13.2	71.1	135.9	18.0	20.4	26.8	24.5	13.7	20.4	21.1	14.7

Appendix C: Capital Cost Estimates and Summary Tables

QUALITATIVE COMPARISON OF SIGNIFICANT CHANGES TO THE NCRR (LPA) AND SUGAR CREEK DESIGN OPTIONS

December 9, 2008

The previous cost estimate developed by others during the Conceptual Engineering phase in Summer 2006 indicated the Sugar Creek Design Option was $26 million more than the NCRR Option (LPA). This previous estimate did not include the cost of any non-transit roadway improvements that may be made to North Tryon Street from Sugar Creek Road to Old Concord Road as part of the NCRR Option.

As Preliminary Engineering has progressed, various refinements have been made to the design of both the Sugar Creek Design Option and the NCRR Option (LPA). Detailed cost estimates for these refined designs will be available in January 2009. In the interim, the following tables identify the significant changes to the previous concepts and a qualitative assessment of the corresponding costs for both options.

These tables indicate that the previous cost estimate for the NCRR Option (LPA) is expected to decrease and the previous cost estimate for the Sugar Creek Design Option is expected to increase. Therefore, the cost difference between the two options is anticipated to be greater than the previous estimate of $26 million.

NCRR Option (LPA) *

	Item	Previous	Current	Addition	Reduction
1	LRT Bridge over NCRR/Norfolk Southern	Approx. 1,000 ft, 8-span "S-shaped" bridge	LRT Bridge over NCRR/Norfolk Southern is now further south and is no longer part of this option		($$$$$$)
2	Approaches to LRT Bridge over NCRR/Norfolk Southern	MSE retaining wall approaches on both ends of bridge	No longer part of this option		($$)
3	LRT Bridge over Sugar Creek Road	Included with NCRR/NS Bridge above	Approx. 100 ft., single span straight dual bridges	$	
4	Sugar Creek Station	Aerial station on multiple spans in combination with LRT bridge over NCRR/Norfolk Southern	Aerial portion of station reduced to one span over Sugar Creek Road with remaining portions at-grade		($)
5	Eastway Station	At-grade	At-grade	- - -	- - -
6	Entrance into North Tryon Street median / Old Concord Road crossing	At-grade crossing	Approx. 500 ft., 3-span curved LRT bridge over Old Concord Road and northbound North Tryon Street	$$$$	
7	Approaches to LRT bridge into North Tryon Street median / Old Concord Road crossing	At-grade crossing	MSE retaining wall approaches on both ends of bridge	$	
8	Width of Proposed Typical Section	135' typical section	147' typical section	$$	
9	Alignment in North Tryon Street	Symmetrical Widening	Asymmetrical Widening		($$)
				($$$)	

** Does not include non-transit roadway improvements to North Tryon Street*

Sugar Creek Design Option

	Item	Previous	Current	Addition	Reduction
1	LRT Bridge over NCRR/Norfolk Southern	Approx. 400 ft., 3-span curved bridge	LRT Bridge over NCRR/Norfolk Southern is now further south and is no longer part of this option		($$$)
2	Approaches to LRT Bridge over NCRR/Norfolk Southern	MSE retaining wall approaches on both ends of bridge	No longer part of this option		($)
3	LRT Bridge over Sugar Creek Road	Included with NCRR/NS Bridge above	Approx. 100 ft., single span straight bridge	$	
4	Sugar Creek Station	At-grade	At-grade	- - -	- - -
5	LRT Bridge over Raleigh Street	Approx. 80 ft., single span straight bridge with retaining wall approaches	At-grade crossing		($)
6	Approaches to LRT Bridge over Raleigh Street	MSE retaining wall approaches on both ends of bridge	At-grade crossing		($)
7	Entrance into North Tryon Street median	At-grade	Approx. 460 ft., 3-span curved LRT bridge over northbound North Tryon Street	$$$	
8	Approaches to LRT bridge into North Tryon Street median	None	MSE retaining wall approaches on both ends of bridge	$	
9	Width of Proposed Typical Section	135' typical section	147' typical section	$$$$	
10	Alignment in North Tryon Street	Symmetrical Widening	Asymmetrical Widening		($$$$$)
11	North Tryon Street / Eastway Drive intersection	At-grade	Approx. 190 ft., 1-span LRT bridge over the North Tryon Street / Eastway Drive intersection	$$	
12	Approaches to LRT bridge over North Tryon Street / Eastway Drive intersection	None	MSE retaining wall approaches on both ends of bridge	$	
13	Eastway Station	At-grade	At-grade	- - -	- - -
14	North Tryon Street / Old Concord Road	At-grade	At-grade	- - -	- - -
				$	

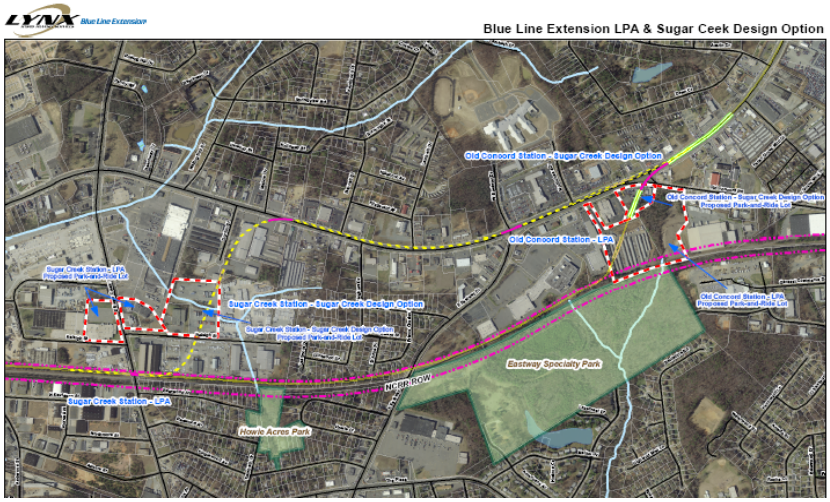
15% PE COST ESTIMATE
SUGAR CREEK AND LPA (NCRR) OPTIONS

Purpose

As part of the evaluation of the Sugar Creek Design Option (SCDO), project cost estimates have been developed for the Sugar Creek Design Option and the corresponding portion of the Locally Preferred Alternative (LPA) along the North Carolina Railroad (NCRR). These project cost estimates are intended to make an "apples to apples" comparison of the estimated cost of the Sugar Creek Design Option and the LPA (NCRR) option.

Sugar Creek and LPA (NCRR) Options

The limits of the Blue Line Extension (BLE) included in this cost comparison run from LRT track plan station 845+00 (north of Craighead Road) to LRT track plan station 958+80 (SCDO) / 956+60 (LPA) (north of Orr Road), a distance of 2.16 miles (SCDO) / 2.11 miles (LPA). The adjacent figure shows a map of the two options.



The **Sugar Creek Design Option** begins north of Craighead Road and consists of the following:

- Runs along the west side of the existing North Carolina Railroad (NCRR) corridor.
- Crosses over depressed Sugar Creek Road on an LRT bridge.
- Leaves the NCRR corridor to the west, north of Sugar Creek Road between two historic properties.
- Provides an at-grade Sugar Creek station midway between the NCRR and North Tryon Street with an adjacent park-and-ride lot for approx. 910 cars.
- Bridges over the northbound lanes of North Tryon Street, north of Dorton Street, on an LRT bridge with retaining wall approaches.
- Runs in the median of North Tryon Street, which is reconfigured into a uniform 4-lane section. North Tryon Street is widened asymmetrically (i.e. with all the widening to the west) to accommodate the LRT in the median.
- Bridges over the Eastway Drive/North Tryon Street intersection on an LRT bridge with retaining wall approaches.
- Provides an at-grade Old Concord station in the median of North Tryon Street, south of Old Concord Road. A park-and-ride lot for approx. 480 cars is provided in the southeast quadrant of the Old Concord Road/North Tryon Street intersection.
- Runs in the median of North Tryon Street to north of Orr Road.

The **LPA (NCRR) Option** begins north of Craighead Road and consists of the following:

- Runs along the west side of the existing North Carolina Railroad (NCRR) corridor.
- Crosses over depressed Sugar Creek Road on an LRT bridge.
- Provides an at-grade/bridge supported Sugar Creek station straddling depressed Sugar Creek Road. Park-and-ride lots for approx. 740 cars are provided west of the station on the north and south sides of Sugar Creek Road.
- Passes under the Eastway Drive highway bridge over the NCRR corridor. Another span will be added to the existing bridge to accommodate the LRT passing under it.

- Runs along the west side of the existing North Carolina Railroad (NCRR) corridor.
- Leaves the NCRR corridor to the west, north of Eastway Drive.
- Provides an at-grade Old Concord station midway between the NCRR and North Tryon Street with an adjacent park-and-ride lot for approx. 500 cars.
- Bridges over the Old Concord Road/North Tryon Street intersection and the northbound lanes of North Tryon Street on an LRT bridge with retaining wall approaches.
- Runs in the median of North Tryon Street to north of Orr Road.

The **North Tryon Street Non-Transit Roadway Improvements** involve improvements to the portion of North Tryon Street that is not impacted by the LPA (NCRR) option. This includes reconfiguring North Tryon Street from Sugar Creek Road to Old Concord Road into a uniform 4-lane section with a median, planting strips, sidewalks and streetscape improvements.

Summary

The 15% Preliminary Engineering (15% PE) estimated project cost of the Sugar Creek Design Option and the LPA (NCRR) option are as follows:

FTA Cost Category	Description	Sugar Creek Design Option (2008 dollars in $millions)	LPA (NCRR) (2008 dollars in $millions)	Difference (2008 dollars in $millions)
10	Guideway & Track Elements	$ 31.7	$ 30.1	$ 1.6
20	Stations, Stops, Terminals, Intermodal	$ 3.4	$ 2.5	$ 0.9
30	Support Facilities: Yards, Shops, Admin. Bldgs.	n/a [1]	n/a [1]	n/a [1]
40	Sitework & Special Conditions	$ 39.5	$ 28.7	$ 10.8
50	Systems	n/a [2]	n/a [2]	n/a [2]
	Subtotal – Construction (Category 10, 20 & 40 only)	$ 74.6	$ 61.3	$ 13.3
60	ROW, Land, Existing Improvements	$ 68.5	$ 28.9	$ 39.6
70	Vehicles	n/a [3]	n/a [3]	n/a [3]
80	Professional Services (Category 10, 20 & 40 only)	$ 25.4	$ 20.9	$ 4.5
	Total - Transit	**$ 168.5**	**$ 111.1**	**$ 57.4**
	North Tryon Street Non-Transit Roadway Improvements	n/a	$ 21.7	($ 21.7)
	Total - Transit	**$ 168.5**	**$ 132.8**	**$ 35.7**

[1] Category 30 – Support Facilities costs are applicable to the entire BLE. The costs for an expanded / new vehicle maintenance, operational and administrative facilities are not known at this time. If included, these costs would be a prorated amount of the total estimate for these facilities for the BLE and would be similar for both options.

[2] Category 50 - Systems costs are applicable to the entire BLE and are not typically broken down by segment under FTA estimating guidelines. If included, these costs would be a prorated amount of the total estimate for systems for the BLE and would be similar for both options.

[3] Category 70 - Vehicles costs are applicable to the entire BLE and are not typically broken down by segment under FTA estimating guidelines. Vehicle costs will not be available until the fleet size is determined. If included, these costs would be a prorated amount of the total estimate for vehicle costs for the BLE and would be similar for both options.

Appendix D: Public Involvement

LYNX Blue Line Extension

Community Workshops

July 10 and 15, 2008

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Alignment and Station Analysis

Sugar Creek Vs. NCRR Alternatives Update

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Background

- Two alternatives were developed for the Sugar Creek / Old Concord area during conceptual engineering.
- MTC recommended the NCRR alignment
  - Presumed to be less expensive
  - Unsure of impact on existing businesses with Sugar Creek
  - Unsure of traffic impacts with Sugar Creek
- Sugar Creek Alternative build costs would be covered by the City without using the transit sales tax
  - Build costs figured into overall project cost
  - Could affect ability to secure federal funding for entire project
- In 2008, City Council identified approximately $21M for Sugar Creek Alternative OR upgrades to North Tryon

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North Tryon Study

- Economic Development (ED) leading revitalization study of N. Tryon St. from Brookshire Freeway to Old Concord Road
- Segment 1: Brookshire to Sugar Creek Road
  - Nearly complete
  - Recommends streetscapes and medians
  - Opportunities for larger redevelopments
  - ED working to secure dollars
- Segment 2: Sugar Creek Road to Old Concord Road
  - Coordinated with Blue Line Extension Preliminary Engineering

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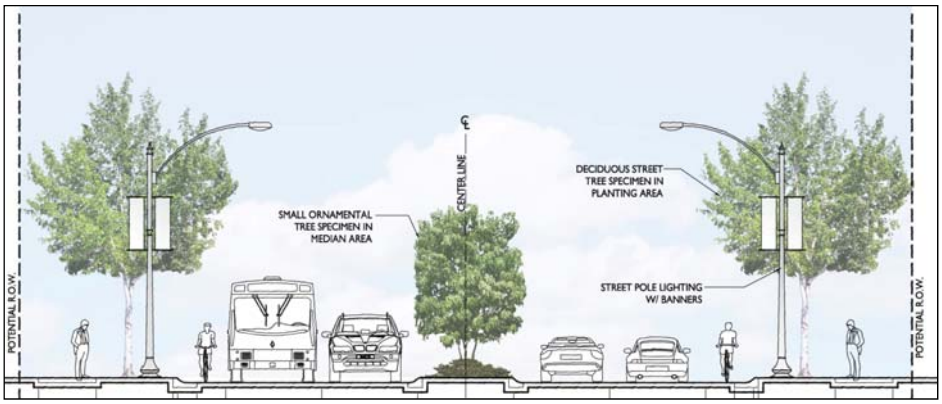
Segment 1: Example of Work



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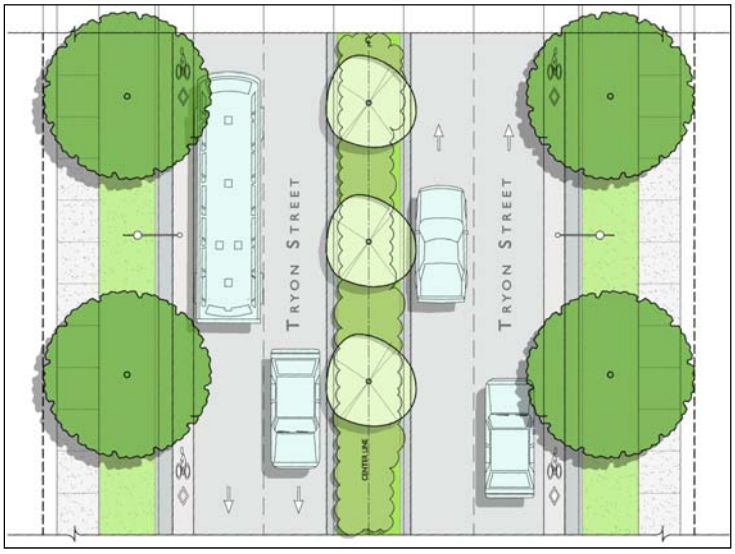
Segment 1: Example of Work



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Segment 2: Evolving Issues / Opportunities

- Pedestrian accessibility and utility
- High traffic volume at Eastway and Old Concord
- Coordination with NCDOT's vision for North Tryon

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NCRR / Sugar Creek Factors

- Sugar Creek and NCRR alternatives are being analyzed using cost benefit model

	With Improvements	With Light Rail
Access to neighborhoods		
Impact to existing businesses		
Potential for new development		
Value of new development		
Employment impacts		
Land value impacts		
Quality of life impacts		
Traffic impacts		
Cost		
Change in land use		

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Evolving Alignment Options & Station Locations

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Sugar Creek Station: Evolving Issues / Opportunities

- NCRR/Sugar Creek Rd. grade separation project
- NCRR alignment
  - Station on bridge over Sugar Creek Rd
  - Highly visible with at-grade access from both sides of Sugar Creek Rd
- Sugar Creek alignment
  - Positions NS property for redevelopment
  - Avoid historic buildings
  - Station closer to N. Tryon
  - Station migrates away from Asian Corners

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Eastway Station: Evolving Issues / Opportunities

- NCRR alignment
  - Improved NCRR station location
  - Potential grade separation of Old Concord Road/entrance to N. Tryon
  - Avoid potential historic property
- Sugar Creek alignment
  - Likely grade separation of Eastway/N. Tryon intersection
  - Station at Old Concord Road to allow at-grade station

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NCRR Alignment Alternative: Sugar Creek Station

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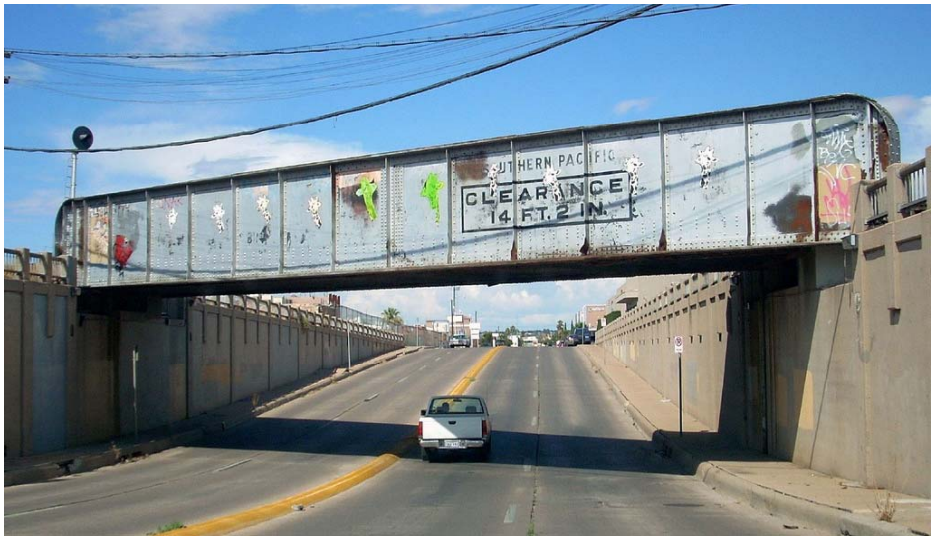
El Paso, Texas



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LYNX Blue Line
CTC/Arena Station

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Sugar Creek Alignment Alternative: Sugar Creek Station

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Sugar Creek Alignment Alternative: Sugar Creek Station

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Sugar Creek Alignment Alternative: Sugar Creek Station

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Next Steps

- ✓ Refined alignment
- ✓ Defined stations
- ✓ Identified historic properties

- ❑ Refine cost estimates
- ❑ Continue market analysis of economic development potential
- ❑ Identify streetscape vision for N. Tryon St.
  - ❑ Sidewalks, landscaping, lighting and other associated infrastructure

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LYNX Blue Line Extension Update

Public Meetings
January 13 and 15, 2009

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www.RIDETRANSIT.org

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Sugar Creek and North Carolina Railroad Alternative Alignments

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Background

- In November 2006, the MTC adopted the 2030 Transit System Corridor Plan
- The 2030 Plan:
  - created Locally Preferred Alignments for future engineering and planning
  - included an alternative alignment of the Northeast Corridor - Sugar Creek Alternative
- January 2008 – approval of funds for preliminary engineering of the BLE - including the Sugar Creek Alternative

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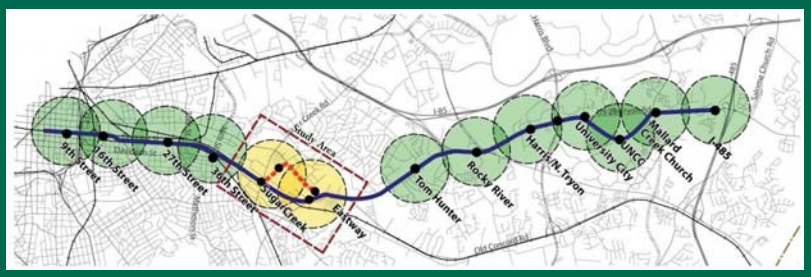
NCRR Alignment and Sugar Creek Alternative

- NCRR Alignment - NCRR ROW from Uptown to Old Concord Road, entering the median of North Tryon at Old Concord Road
- Original Sugar Creek Alternative designed to exit NCRR ROW at Sugar Creek Road, through Asian Corners and then North Tryon median



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Sugar Creek Alignments

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Why study the Sugar Creek Alternative?

- Need for revitalization along North Tryon, including the vicinity of Sugar Creek and Old Concord Roads
- Can Sugar Creek Alternative in 2030 Plan spur higher ridership and more redevelopment?
- June 2008 – $18 million committed in CIP over five years for construction of Sugar Creek Alternative if economic benefits justified cost

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Changes Affecting Economic Development Impact

- **Sugar Creek Alignment**
  - Modified by Sugar Creek Road underpass
  - Modified to avoid historic properties
  - Now hidden behind Asian Corners – reduces economic development impact
  - Impacts existing businesses and eliminates access - new bridges at Dorton Street and Eastway

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Changes Affecting Economic Development Impact

- **NCRR Alignment**
  - Sugar Creek Road underpass creates at-grade station and greater economic development potential from proximity to NoDa
  - At-grade station has stronger connection to Asian Corners– creates stronger potential for redevelopment
  - At-grade stations have greater impact than aerial

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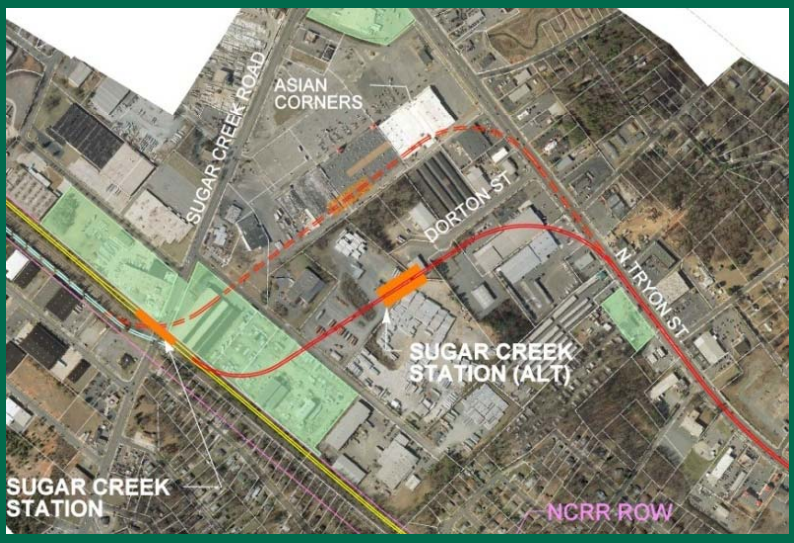
Sugar Creek Alignments



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NCRR Alignment: Sugar Creek Station

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Economic Impact: Major Findings

- Both alignments generate approximately the same economic benefit
  - New Sugar Creek Alternative does not affect Asian Corners
  - Limited access along North Tryon in the Sugar Creek Alternative impacts existing businesses
  - Sugar Creek Station in NCRR Alignment now closer to Asian Corners and abuts north end of NoDa

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Economic Impact Comparison

- NCRR Alignment projects 10%–18% higher commercial and retail growth by 2030
- NCRR Alignment projects 5% higher residential growth by 2030
- Similar amounts of demolition of existing buildings by 2030
- Sugar Creek Alt results in relocations of 31 businesses
- NCRR Alignment results in relocations of 21 businesses

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Economic Development

Analysis Factor	Measure	NCRR	Sugar Creek Alt
o Economic Impact	Business relocations	21	31
o Demolition 2008 - 2030	Square feet- includes retail, office and industrial	**Total = 1,381,226**	**Total = 1,412,575**
o Redevelopment potential- residential	Unit count through 2030	1,025 – 1,175	960 – 1,120
o Redevelopment potential- office	Square feet through 2030	90,000 – 150,000	80,000 – 125,000
o Redevelopment potential retail	Square feet through 2030	305,000 – 470,000	350,000 – 470,000

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Transit and Transportation Impacts

- **Transit**
  - No appreciable difference in projected ridership or travel time
- **Transportation**
  - No appreciable difference in through traffic mobility
  - Left turn access impacted more with the Sugar Creek Alternative
  - NCRR Alignment has moderately better access for walking, biking and better automobile circulation

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Transit

- No appreciable difference in ridership and travel time

Analysis Factor	Measure	NCRR Alignment	Sugar Creek Alt
o Ridership	Total daily boardings	21,600	21,600
o Travel Time	7th to I-485	24 minutes	24 minutes
o Transportation System User Benefits	Hours of travel time savings	Same	Same
o Safety	Number of conflict points (street crossings of rail)	I at Old Concord Station	2 at Sugar Creek Station 1 at Lambeth and Tryon 1 at Old Concord Road

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Transportation

Analysis Factor	Measure	NCRR Alignment	Sugar Creek Alt
Vehicular Operations	Travel time AM Sugar Creek to Orr Road (minutes)	SB = 9 NB = 9	SB = 9 NB = 9
	Travel time PM Sugar Creek to Orr Road (minutes)	SB = 12 NB = 20	SB = 11 NB = 20
	Speed AM Sugar Creek to Orr (mph)	SB = 12 NB = 13	SB = 13 NB = 13
	Speed PM Sugar Creek to Orr (mph)	SB = 10 NB = 6	SB = 10 NB = 6
Left turn access on North Tryon		31 driveways lose left turn access in streetscape plan	85 driveways lose left turn access, 6 intersections become right in, right out only.

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Environmental Impacts

- The Sugar Creek Alt. has more property acquisitions
  - 68 acquisitions in Sugar Creek Alternative (25.97 acres)
  - 30 acquisitions in NCRR Alignment (15.01 acres)
- Sugar Creek Alt. has more potential wetland, visual and historic property impacts
- The NCRR Alignment has three potential vibration impacts to Howie Acres

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Environmental Impacts

Analysis Factor	Measure	NCRR Alignment	Sugar Creek Alt
o Acquisitions	Number of parcels	30	68
o Displacements	Business relocations	21	31
o Noise Affected Receivers	Receivers impacted	None	None
o Vibration Affected Receivers	Receivers impacted	3 homes	None
o Historic Resources Affected	Number / acres of resources affected	3 indirect impacts	1 direct impact 3 indirect impacts

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Land Use / Urban Design

- **NCRR Alignment**
  - Sugar Creek Station has higher visibility and abuts wider variety of land uses
  - Old Concord Station needs new street network
- **Sugar Creek Alternative**
  - Sugar Creek Station has low visibility and needs new street network
  - Old Concord Station provides more TOD
  - Acquisitions impact on North Tryon may affect reuses of parcels
  - More visual and physical barriers created

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Costs

- 2006 2030 Plan Gap - $26 million
- 2009 Refined Gap - $57.4 million
- The NCRR Alignment:
  - 1 bridge removed over NCRR / Norfolk Southern
  - Station at Sugar Creek at-grade
- The Sugar Creek Alternative:
  - Grade separation at Eastway required
  - Greater real estate costs due to wider cross section than originally planned

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Summary

- Alignments similar in travel time and ridership
- Alignments similar in environmental impacts
- Alignments similar in economic development impact
- Sugar Creek creates negative visual impacts
- Sugar Creek reduces access to existing businesses
- Sugar Creek more costly

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Blue Line Extension Light Rail Project
Northeast Corridor
Public Involvement Summary

Individual Meetings

As of March 2009, representatives from the CATS' Blue Line Extension (Northeast Corridor) Project team have participated in speaking engagements to inform the community and interested parties on the progress and scope of the project. CATS' staff held a total of 60 individual meetings with a total of 1,892 people in attendance. The following table provides the dates, organizations, and number of attendees for each meeting.

DATE	ORGANIZATION	ATTENDANCE
June 8, 2000	Optimist Park Neighborhood Association Meeting	25
February 7, 2001	Historic Rosedale Neighborhood Association Meeting	13
February 18, 2001	Hunters Chase Neighborhood Association Meeting	15
March 13, 2001	Autumnwood Neighborhood Association Meeting	13
June 22, 2001	Belmont Neighborhood Jamboree	16
July 19, 2001	Hidden Valley Neighborhood Meeting	21
July 24, 2001	Derita Area Meeting	34
November 5, 2001	Graham Heights Neighborhood Association Meeting	31
April 18, 2000	First Union CIC Advisory Group Meeting	18
June 20, 2000	First Union CIC Advisory Group Meeting	35
June 20, 2000	I-85 Improvement Study Meeting	10
October 12, 2000	Tryon North Development Corporation Kick-off	80
November 16, 2000	Tryon North Development Corporation Meeting	38
July 18, 2001	Tryon North Development Corporation Meeting	25
July 25, 2001	UNCC Urban Institute Meeting	5
July 27, 2001	Lowe's Motor Speedway	1
August 2, 2001	Mayor's International Cabinet	40
August 21, 2001	Landex (developer of King's Grant)	1
August 21, 2001	Verizon Pavilion	2
September 25, 2001	UNCC Facilities Management Staff	2
September 28, 2001	University Research Park Stakeholders Meeting	10
October 2, 2001	Southwest Cabarrus Rotary Club Meeting	25
November 29, 2001	Mtg with NE Corridor Business/Neighborhood Leaders	22
June 1, 2002	Historic North Charlotte Historic Home Tour and Festival	15
July 7, 2002	University City Area Council Luncheon	60
August 15, 2002	Tryon North Development Corporation reps	4
August 15, 2002	Cabarrus County Commissioners Meeting	45
November 13, 2002	Hidden Valley Community Development Corporation	14
June 24, 2004	Tryon North Development Corporation	25
July 8, 2004	University City Area Council Luncheon	40
July 14, 2005	University City Area Chamber	80
October 18, 2005	NoDa Business and Homeowners' Associations	28

October 20, 2005	NW Area Council Economic Development Conference	200
April 12, 2006	District Four meeting with Councilman Barnes	25
February 6, 2007	Rotary Club, Lowes Speedway Club	21
November 1, 2007	University City Partners (UCP) Annual Conference	80
November 12, 2007	University Research Park (URP) Community Meeting	10
January 20, 2008	Northeast Coalition of Neighborhoods	40
January 29, 2008	Coldwell Bankers	22
February 13, 2008	University City Partners	55
February 18, 2008	UNC Charlotte Students - History/AIT project	30
March 5, 2008	North Tryon Development Corporation	35
April 16, 2008	Collinswood Language Academy OLI	80
May 1, 2008	UNC Charlotte Students Exhibit – History/AIT Project	60
May 2, 2008	Central Lake Park Academy OLI	25
June 3, 2008	Hidden Valley Community Association	35
June 3, 2008	No Da Business and Homeowners' Associations	60
June 10, 2008	Howie Acres and Herrinwood Community Meeting	8
July 17, 2008	Developers Meeting	24
August 5, 2008	NoDa	40
September 12, 2008	UNC Charlotte Engineering Class	60
September 30, 2008	NoDa Board	10
October 1, 2008	UCP Urban Design Meeting	10
October 2, 2008	UCP Annual Meeting	60
November 8, 2008	CMC	8
November 11, 2008	NoDa Neighborhood Association	30
December 2, 2008	Hidden Valley Community Association	12
January 27, 2009	Knollwood Acres Homeowner's Group	15
February 4, 2009	North End Partners	20
February 10, 2009	Villa Heights	24
TOTALS	**60**	**1892**

Public Meetings

In addition to the meetings listed above, representatives from the community have been invited to participate in public meetings to offer input and feedback on the Northeast Corridor Project. Since 2000, CATS staff held 32 public meetings with a total of 1,293 people in attendance. The following table provides the dates, purposes, and number of attendees for each meeting.

DATE	PUBLIC MEETING	ATTENDANCE	POSTCARD NOTIFICATION
July 20, 2000	Corridor Kickoff Public Mtg, Government Center	93	
September 26, 2000	MIS Scoping Public Mtg, Mallard Crk Presby Church	10	
September 28, 2000	MIS Scoping Public Mtg (*with C'wide Study*), Sugaw Crk Rec Ctr	25	
January 8, 2001	MIS Screening Public Mtg, Mallard Crk Presby Church	18	
January 23, 2001	MIS Screening Public Mtg, Sugaw Creek Presbyterian Church	36	
October 9, 2001	MIS Public Mtg, Sugaw Creek Presbyterian Church	22	
August 27, 2002	MIS Public Mtg, Sugaw Creek Presbyterian Church	64	
February 22, 2005	Northeast Corridor Public Meeting	9	
February 24, 2005	Northeast Corridor Public Meeting	10	
March 1, 2005	Northeast Corridor Public Meeting	25	8000
April 5, 2005	Northeast Corridor Public Meeting	31	
April 7, 2005	Northeast Corridor Public Meeting	26	8000
June 7, 2005	Northeast Corridor Station Location Workshop	18	
June 9, 2005	Northeast Corridor Station Location Workshop	20	8500
September 6, 2005	Northeast Corridor Station Area Planning Workshop	23	
September 8, 2005	Northeast Corridor Station Area Planning Workshop	28	8500
December 6, 2005	Northeast Corridor Public Workshop	29	
December 7, 2005	Northeast Corridor Public Workshop	25	6600
May 1, 2006	Northeast Corridor Design Options Public Meeting	38	
May 2, 2006	Northeast Corridor Design Options Public Meeting	26	8000
June 5, 2006	Northeast Corridor Public Meeting – MTC Presentation	40	
June 6, 2006	Northeast Corridor Public Meeting – MTC Presentation	34	8000
March 3, 2008	PE Kick Off Presentation - Sugaw Creek Presbyterian Church	85	
March 4, 2008	PE Kick Off Presentation – University Hilton	105	12711
April 29, 2008	UNC Charlotte Public Forum	100	
July 10, 2008	Sugar Creek vs NCRR Alignment - Oasis Shriners Center	52	
July 15, 2008	Sugar Creek vs NCRR Alignment - Sugaw Crk Presby Church	84	12046
January 13, 2009	Sugar Ck/NCRR Alignment Study Results and Recommendation and Station Site Plans - Sugaw Creek Presbyterian Church	94	
January 15, 2009	Sugar Ck/NCRR Alignment Study Results and Recommendation and Station Site Plans - Oasis Shriners Center	49	11580
February 16, 2009	BLE Project Update – CMGC – City Employees	64	
March 24, 2009	Community Art Meeting – University Hills Baptist Church	10	
March 31, 2009	Community Art Meeting - Sugaw Creek Presbyterian Church	37	
TOTALS	**32**	**1330**	

Preliminary Decisions Based on Public Input

Since 2000, there have been 92 individual and public meetings concerning the Blue Line Extension project with 3,222 attendees. These meetings provide CATS staff with an opportunity to solicit valuable feedback from community members and other stakeholders. Public input received during these meetings has factored into preliminary decisions made by CATS staff regarding the Blue Line Extension Project. Decisions affected by public input include the following:

- Corridor alignment
- Station locations
- Build alternatives for the MIS and PE phases
- Community involvement in the art-in-transit program

Other Methods of Engaging the Community

In addition to the meetings listed above, CATS offers citizens a variety of ways to learn about and contribute to the Blue Line Extension light rail project. Below is a list of those means.

Newsletter

CATS Blue Line Extension project team publishes articles in a newsletter, entitled *Transitions*, to provide interested citizens with updates on the project. The newsletter features articles about the project and includes information about land use, economic development, upcoming meetings and other projects within the corridor. The publication is mailed to those on the project mailing list and e-mailed to those enrolled in the City of Charlotte's electronic subscription service. The newsletter is made available at, but not limited to, corridor public meetings, neighborhood presentations, transit fairs, and the CATS offices in the Charlotte-Mecklenburg Government Center. *Blue Line Extension Transitions* can also be viewed on the Northeast Corridor project web site at www.ridetransit.org.

TRANSITIONS NEWSLETTER ISSUES	CIRCULATION
Winter 2005	
Summer 2005	1485
Spring 2006	
Fall 2006	860
2030 Corridor System Plan Summary (Winter 2007)	
Summer 2007	868
Winter 2008	874
Spring 2008	870
Summer/Fall 2008	762
TOTAL NEWSLETTERS MAILED	**CURRENT CIRCULATION**
9	**870**

Web Site

Throughout the course of the project, CATS has maintained a project specific web site. Information contained on the site includes the following:

- Description of the project;
- Map of the proposed alignment and station locations;
- Information about light rail stations and vehicles including renderings;
- Transit Station Area Principles;
- Published editions of the *Blue Line Extension Transitions* newsletter;
- Notification of upcoming public involvement activities;
- Summaries and PowerPoint presentations of past public meetings;
- Frequently asked questions about the project; and
- Comment card allowing users to provide input into the project.

The web address for the Blue Line Extension web site is www.ridetransit.org and click on Northeast Corridor.

Project Mailing Lists

CATS maintains a county-wide corridor database for use in direct mail contacts with corridor property owners, occupants, and other stakeholders. The original list of approximately 500 names was obtained from the *2025 Transit/Land Use Plan* public involvement efforts. It has been supplemented over the life of the project as additional individuals, organizations, and others have requested to be added to the list. The corridor database now contains 6,796 contacts.

This database includes a mailing list for people specifically interested in the Blue Line Extension. These 870 individuals (as of March 2009) are located in and around the Northeast Corridor study area and/or have expressed specific interest in the Blue Line Extension light rail project. This list is used for distribution of Blue Line Extension public meeting invitations, newsletters, and as needed.

Through the Mecklenburg County Geographic Information System, CATS also maintains a list of property owners and residents within a half-mile of the proposed station locations to supplement the Northeast Corridor specific mailing list for notifications of public meetings. There are 1,514 subscriptions for the Blue Line Extension in the City of Charlotte's electronic subscription service.